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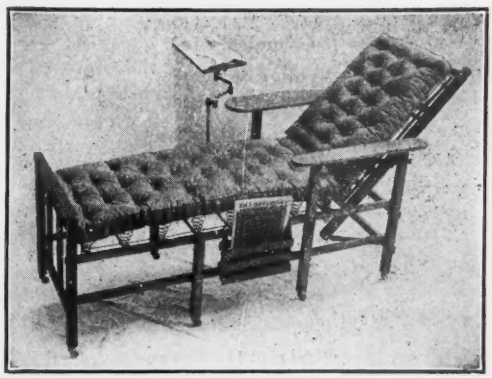

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THE MEDICAL ASPECTS OF THE FRAMINGHAM COMMUNITY HEALTH AND TUBERCULOSIS DEMONSTRATION

DONALD B. ARMSTRONG

Executive Officer

INTRODUCTION

A report of the progress of the Framingham Community Health and Tuberculosis Demonstration, particularly along medical lines, promises to be of value at this time, in view of the emphasis which the war is placing upon the need for human conservation, and the heavy burdens which the war will throw upon communities everywhere. The necessity for adequately meeting community health obligations is greater than ever before. Of interest in tuberculosis work in particular, it is felt that perhaps the indications of the Framingham experience in its bearing on community health machinery and problems of disease prevention may also have a wider significance.

The Framingham Community Health and Tuberculosis Demonstration, initiated in December of 1916, has been in actual operation for a little more than a year. The foundations have been laid and the work is proceeding, stimulated rather than retarded by the world war.

Coöperation from government and private agencies has been generous and helpful. Advice and practical assistance have been received from many branches of the government of the United States and of the government of the State of Massachusetts. Many private agencies have contributed to the work, such as the American Museum of Safety, the Russell Sage Foundation, the Massachusetts Institute of Technology, etc. Locally, the community has been quick to meet its obligations, and to seize opportunities for advancement along health lines. Numerous local agencies have participated in the work, including the town government, private civic associations, business organizations, insurance companies, private charities, churches, clubs, and individual citizens.

The Framingham Community Health and Tuberculosis Demonstration, conducted by the National Tuberculosis Association is under the

supervision of a special committee on which are represented the National Association, the Massachusetts State Department of Health, the United States Public Health Service, private antituberculosis organizations in Massachusetts, Connecticut, New York, and Pennsylvania, Framingham health agencies, and the Metropolitan Life Insurance Company, the donor of the $100,000 devoted to the work.

The activities thus far have demonstrated the necessity and efficacy of an educational, persuasive approach to the community. The work throughout has been "Framingham's opportunity" and not an experiment "on" the town. Locally, it is Framingham's experiment, and it will be Framingham's experiment nationally, if it demonstrates that it is practicable for a community, within reasonable expenditure limits, to "sanitate" itself.

THE PROGRAM

While it is the object of this paper to present primarily the medical findings to date, at the same time it may be worth while to outline, as briefly as may be, the scope or program of the work. The essentials of the Demonstration, as adopted by the committee, are as follows:

1. The sympathetic coöperation of individuals and organizations, public and private, in Framingham, and the carrying out of the work as Framingham's Plan, on an educational and democratic basis, at a minimum of cost.

2. The utilization of expert advisory service whenever feasible, and the encouragement of the community to meet its own health obligations, not only during the period of the Demonstration, but subsequently, in order that the non-experimental activities of permanent value to the community may be perpetuated subsequent to the close of the experimental period.

3. The concentration on tuberculosis as the major interest of the Demonstration, and the designing and development of the program as a war measure to meet the emergencies in the health field as emphasized in the present international crisis.

The development of an adequate community health program presents theoretically certain clear and distinct aspects:

1. The preparation of the community for participation in and an understanding of the work.

2. The diagnosis of community conditions, as to: (a) the environment; (b) the individual.

3. The application of the diagnostic findings to the community's special disease prevention problems. This step may be called "community treatment."

The main preparatory steps have included the issuing of special literature; the formation of local committees; the encouragement of the community to appropriate funds for its own health requirements; the development of a local medical organization; the determination of diagnostic, classification and therapeutic standards for tuberculosis; the establishment of adequate laboratory facilities, etc.

The community diagnostic steps on the environmental side have included an analysis of the community's statistical background, a study of general sanitary conditions in schools, factories, and in general throughout the community. As regards the people themselves the important measures have included a survey of the hazards of infant life, a tuberculin survey among children, a sickness canvass, a medical examination campaign, the establishment of an expert medical consultation service, etc.

In addition to the foregoing investigative aspects of the community study there are the community treatment measures, now being undertaken. These involve the correction of environmental conditions, at home, at work, or in school; continuous education and publicity; the coördination of nursing and other local health activities; the control over milk and food supplies; and the development of out-patient medical service, together with special concentration on the hygienic and treatment problems of the tuberculosis cases as discovered in the medical examination or consultation work in school, factories, among infants, in physicians' offices, at the dispensary, or elsewhere.

THE FIRST YEAR'S WORK

During the first year the main objectives may be summarized as follows:

The thorough medical examination of a substantial proportion of the population, the discovery of cases of tuberculosis, and the lending of assistance to the community in the development of its program of organization to meet its own health obligations.

During this year the activities of the Community Health Station have included the voluntary expert examination of 5000 of the pe ple of Framingham, about one-third of the population; an effort to discover

and to place under treatment or observation incipient, advanced, or arrested cases of tuberculosis, numbering at present about 180; the provision of summer camp facilities for 100 delicate children; the tuberculin testing of approximately 500 children between the ages of one and seven years; the referring of 4000 cases of illness or defect other than tuberculosis to local physicians for treatment, and the carrying out of the special surveys mentioned in the preceding paragraphs on "the program."

On the side of community organization the main instruments, financed almost entirely by the community itself, have included a full time tuberculosis nurse under the Board of Health; two all the year round infant welfare clinics with full time nursing service; full time medical, nursing and clinic service for the public schools; full time medical, nursing, dispensary, and first aid equipment for the larger industries; the establishment of community houses for social and health work; the development of a medical club; domestic science classes; a group of neighborhood, lay committees for education, sickness reporting, and other activities.

All of this machinery is organized for two purposes; first, to serve the general health needs of the community, and second, to discover, control, and prevent tuberculosis.

THE CHIEF MEDICAL ASPECTS

A. Local medical organization. One of the first things undertaken in Framingham was the development, with the coöperation of local physicians, of a medical club, under the supervision of a local governing committee. Practically all of the practising physicians in Framingham are now members of this club, and under its auspices have been conducted a series of lectures and clinics dealing with important medical phases of the tuberculosis problem. With the aid of a committee of experts, a set of experimental diagnostic standards for tuberculosis among children and adults has been developed and is now in use in Framingham. The physicians have been encouraged to report all cases of tuberculosis, and to use the expert consultation service established by the Community Health Station, for the diagnosis of doubtful or difficult cases of disease. Special medical service has been provided for the infant clinics and for the schools and factories,—this service being largely diagnostic in character, cases of illness being referred to physicians of the patient's own choosing for treatment.

It is hoped that the future may see the development of a plan for general morbidity reporting, the establishment of an out-patient, moderate-fee clinic service, the more extensive use of expert consultation service, and the use of medical machinery in general to elevate and standardize the methods of diagnosis and treatment for tuberculosis.

B. The sickness canvass. Early in the work at Framingham a lay canvass for existing illness was made, being undertaken as a measure for obtaining a reliable percentage figure for admitted illness. It was also thought that such a canvass might serve as a useful basis for comparing sickness census findings with subsequent medical examination findings. The sickness census was also considered a necessary step, as a measure for comparing illness findings at the beginning, with similar findings at the end of the demonstration.

The carrying out of this census was in many respects similar to sickness canvasses or health censuses undertaken elsewhere in the country, by the Metropolitan Life Insurance Company and other agencies. As canvassers there were used the agents of the several larger insurance companies in Framingham, their work being supplemented by nurses. Representative sections of the community were chosen, and the month of April, 1917, selected as the time for this work.

The chief results of this study may be summarized as follows:

1. In the census group as a whole, comprising 1455 families or 6582 individuals, the sickness rate was 6.2 per cent, based on 407 recorded cases of illness. The commonest affections, and the percentage which they constituted of the entire amount of illness recorded, were as follows: colds, 13.5 per cent; cardiac diseases, 8.6 per cent; rheumatism, 6.6 per cent; tuberculosis, 3.9 per cent; pregnancy, 3.2 per cent; diseases of the kidneys, 2.7 per cent; "nervousness," 2.7 per cent; influenza, 2.7 per cent; bronchitis 3.9 per cent; etc.

The sickness rate (6.2 per cent) is considerably higher than the rates usually recorded in previous sickness surveys, due to the fact that many minor illnesses were recorded in this study. When the definition of illness is restricted so as to include only incapacitating affections, the sickness rate drops to 1.8 per cent, a rate more comparable with findings elsewhere.

2. The sickness survey disclosed 16 cases of probable tuberculosis, constituting 0.24 per cent of the total number censused, and 3.9 per cent of the total number of illnesses recorded.

3. The rate of disability was 54.1 per cent,—a relatively low figure,

to be accounted for largely by the fact that many minor illnesses were recorded.

4. The percentage of individuals recorded as sick who were receiving medical attention was 81.1 per cent, a figure somewhat higher than findings elsewhere.

5. The sex distribution of individuals censused was a very equitable one, the figures being 3260 males, and 3322 females. On the other hand, the sick rate for females is relatively high (70.4, as compared with 53.1 for males). These figures, however, tend to coincide with the sex and age distribution in the community, a distribution characteristic of the older neighborhoods.

6. The tabulation for families in which sickness occurred, according to economic condition, showed sickness rates of 5.2 for the families recorded as being in good economic condition, 7.4 for families in fair, poor and bad condition, and 5.2 for families whose economic condition was unknown.

7. The percentages for illness discovered in the sickness census offer a basis for interesting comparison with actual findings on medical examination, and will be discussed under a subsequent heading.

C. Medical examination work. Up to the present time approximately 5000 people have been given thorough medical examinations by men expert in tuberculosis work, each examination accompanied by a microscopical and chemical urinalysis. For the most part this work has been carried out in "examination drives." The first drive, covering 1700 people, occurred in April, 1917, in conjunction with the sickness canvass, covering in large part the individuals censused at that time. The second drive took place in November, 1917, at which time approximately 2800 individuals were examined. In the meantime, a sufficient number have been examined to bring the total up to 5000 individuals.

At the present time the final tabulation of all the details of the second medical examination drive has not been completed, and for that reason the figures and percentages given below will be based on the results of the first examination campaign. Further, in this part of the discussion the remarks will be confined for the most part to the general medical findings, the details regarding tuberculosis discoveries being presented in a subsequent section of this article.

The medical examination campaign was undertaken as a measure for obtaining an accurate, cross-section picture of illness in a supposedly normal group of individuals in an industrial community; as a measure

for obtaining an accurate figure on actual illness for comparison with health census findings regarding admitted or recognized illness; and as a practical means for discovering, in a non-intensive way, a certain number of tuberculosis cases.

The procedure involved in the main the following steps:

1. The selection of families for the examinations. For the most part, the consent of families for examination was secured by nurses and insurance agents at the time of the preceding sickness canvass. Other families were secured through private physicians, through newspaper advertisements, special literature with cut-out slips for the return of name and address, etc.

2. The selection of expert examiners for the work, being secured from the State Department of Health, the tuberculosis institutions in Massachusetts, Connecticut, and elsewhere.

3. The laboratory arrangements. In the first examination drive all of the urinalyses were carried out in Framingham, a number of analysts being retained for this work. Subsequently the urine specimens were forwarded to New York daily, where they were examined in the laboratories of the Metropolitan Life Insurance Company.

4. The examinations themselves. For the most part, the examinations were carried out in the homes of the patients; two physicians and a nurse visiting as many homes as could be scheduled during the late afternoon and evening, this being the time when the majority of the family could be found at home. At this time a history was taken, an examination made, a urine specimen collected, and a preliminary statement left with the person examined regarding his condition, with recommendations as to the need for medical treatment.

5. Following the first examination campaign an examination day was set, at which time all who desired an examination were invited to come to the Community Health Station, the local physicians being urged to observe and participate in the work. The holding of examination days was subsequently abandoned, as being a relatively inferior method from the point of view of cost and accomplishment, as compared with the home visits.

6. The follow-up work. Communications regarding non-tuberculous findings were sent to all individuals examined. Those individuals recorded as being suspiciously or positively tuberculous were followed up with nursing visits, sputum examination, temperatures, X-rays, etc., before a final diagnosis was determined upon. In each

instance, the patient was urged to name a local physician, and an effort was made to secure a consultation with him in the presence of the patient.

The results of the first medical examination drive in Framingham were chiefly as follows:

1. There were in all 1682 examinations, 732 males and 950 females.

2. For both sexes 44 per cent of those examined were under fourteen years of age.

3. There were discovered 1329 non-tuberculous affections, and 48 cases of tuberculosis, giving a total amount of illness of 1377 cases, or 82 per cent of those examined.

The most conspicuous affections were as follows: defective teeth, 300; enlarged tonsils, 213; adenitis, 146; colds, coryza, 65; cardiac disease, 49; tuberculosis, 48; pharyngitis, 38; bronchitis, 30; kidney disease, 23; arterial disease, 21.

4. The ratio of illness to the total examined was the same for each sex.

5. The percentages of illness according to nationalities were as follows: Americans, 81; Italians, 79; Irish, 76; Poles, 81; Scandinavians, 83; Jews, 95; others, 89.

6. The findings according to families for the several income groups used in the study were as follows: less than $700, 17 per cent; $700 to $1200, 18 per cent; $1200 to $1800, 15 per cent; $1800 and over, 16 per cent; incomes unknown, 16 per cent.

7. A tally of total affections discovered in the 1682 people examined, including the 1329 major non-tuberculous affections, the 48 cases of tuberculosis, and 1211 chief complications, gives a total number of diseases recorded of 2588. A classification of these affections as to their preventability placed 57 per cent in the entirely preventable class. The preventable and doubtfully preventable groups combined constituted 84 per cent of the total, leaving an entirely non-preventable group of 16 per cent.

8. Comparison of medical examination with Health Census findings:

a. In the health census, using a definition of illness which included minor affections, the percentage sick of the total canvassed was 6.2; in the medical examination work, using an equally liberal definition of illness found, the percentage sick of the total number examined was 82, or 13.2 times the amount of sickness found in the sickness canvass.

b. In the health census or sickness canvass, 0.24 per cent of the total people canvassed were recorded as tuberculous; in the medical examination work 2.85 per cent were found to be tuberculous, or 11.9 times the health census findings.

c In the health census, tuberculosis constituted 3.9 per cent of all the illness cases recorded; in the medical examination work, tuberculosis constituted 3.5 of the illnesses found, or 0.4 per cent less than in the health census.

D. The von Pirquet survey. A von Pirquet tuberculin survey of children between the ages of one and seven years was carried out during the summer of 1917, the work being done by a single expert. The reasons for undertaking this work were:

1. To determine at the beginning of the demonstration the percentage of positive reactions in a definite age group, as an index of infection for comparison with possible subsequent findings.

2. To determine the comparative reaction percentages for different nationalities, neighborhoods, etc., and the reliability of the tuberculin test in the younger age groups as an index of genuine tuberculous disease.

3. To throw light, if possible, on sources of childhood infection, and to select those children most needing special hygienic care.

The subjects for this test were selected on a family basis, consent being gained by nurses visiting selected portions of the community. For the work the tuberculin (O.T.) was secured from the Saranac Research Laboratories. The tests were made in the home, followed by twenty-four and forty-eight hour inspections. In order to check up the findings a certain number of reëxaminations were made. All of the children were given a medical examination, and special follow-up examinations were performed upon the children with positive reactions.

The results showed for males 32 per cent positive, and for females 35 per cent, the children being practically uniformly distributed throughout the ages covered, and totaling 460 in all. A decided increase in the percentage of positive reactions was noted for both males and females at the beginning of the school age, as indicated by the percentages for the year six to seven, when 38 per cent of the males were found to be positive and 55 per cent of the females.

Of special interest were the findings according to nationalities. These ranged as follows: Italian, 51 per cent; Irish, 30 per cent; Jewish, 30 per cent; American, 18 per cent; others, 27 per cent. Upon reëxamina-

tion of the positive reactors, no clinically active cases were discovered. These children will be given reëxaminations subsequently, to ascertain if any of them show a later development of active signs and symptoms.

It is interesting to note that while Italian stock gives the highest percentage of positive reactions, very few active cases of tuberculosis have been found among the Italians either in adults or children. On the other hand, while the percentage of positive reactions among Irish children is low, the Irish stock in Framingham and elsewhere contributes more than its share to active tuberculosis, particularly among adults. Careful studies are being made of environmental conditions, milk supply, etc., and it is hoped that eventually this study, with its sequel, will throw some light on the problems of exposure and resistance.

E. Nursing coördination. The coördination of the various nursing activities in the community is considered of prime importance to the success of the demonstration. This should include the work at the local hospital training school, the district nursing activities, the relief and infant welfare nursing, the school nursing, the industrial nursing, the tuberculosis nursing, the community center nurses working from the community houses, etc. As a part of this work there is also proposed a course of instruction for nursing assistants, to be carried out by the hospital, in coördination with the Nurses' Training School, and the Domestic Science Department of the State Normal School.

F. Tuberculosis findings. The staff for tuberculosis work includes the physicians and nurses engaged by the Health Station for the discovery and diagnosis of cases, and a nurse employed by the Board of Health for the follow-up and treatment of cases after their status has been determined. Cases come to the attention of the health office from various sources, indicated in the following list showing the number derived through the several avenues of discovery: on record at the beginning of the work, 27 cases; examination drives, 86; the draft, 7; special consultations, 26; reported by physicians, 32; factory examinations, 2. This gives a total of 180 cases of all kinds which have come under the direction of the health station workers since the beginning of activities in Framingham.

Of these 180 cases, 18 have died, 16 have left town or have been lost, 15 are receiving treatment in out of town institutions, and 131 are under care in Framingham. Of 146 living cases, 55 are incipient, 23 are advanced, and 68 are arrested: 136 are pulmonary and 10 non-pulmonary. Since the beginning of the Demonstration there have been

under the care of the Health Station, including lost and dead cases, 112 active cases, either incipient or advanced.

The death rate from tuberculosis for the period 1906 to 1916, with corrections resulting from a special study of the reliability of mortality certification, has averaged 120 per 100,000. Ordinarily in the past about 35 cases have been known at any one time, which constitutes 0.22 per cent of the population, and averages 2.3 cases per death. With an average number of deaths of 15 annually, it has been estimated that on a basis of 6 cases to a death, there should be in Framingham about 90 active cases.

It is interesting to note that among the 4500 individuals examined in the special drives in Framingham, there were discovered 91 cases, giving a morbidity rate of 2 per cent. This rate applied to the town would give 320 cases, active and arrested. This basis would indicate that there were in the community 19 cases for every death, including arrested cases, and about 10 cases for every death, when active cases alone are considered. About 49 per cent of the 91 cases discovered in this group were arrested, which would mean that there should be in Framingham approximately 163 active cases. As stated above, during the last year, 112 cases have come under the observation of the workers.

It is necessary, of course, to await future developments before a decision can be reached as to the reliability of the above rates. It is not the purpose of this paper to attempt to draw conclusions at this time. The findings are presented to indicate the scope of the Framingham work and its tendencies. It may be stated that at the present time a series of monographs is being prepared, dealing separately with each of the studies mentioned above as well as other activities not here touched upon. In this monograph series the results will be presented more in full and tentative conclusions suggested so far as that is scientifically reasonable.

G. General mortality findings for 1917. Finally, it may be worth while here to indicate briefly in a summary fashion the mortality rate tendencies in Framingham as indicated by 1917 findings. Obviously, no conclusions can be based on these findings:

a. The general death rate, corrected for non-residents, has averaged 13.65 per 1000 for the last ten years in Framingham (1906 to 1916). In 1917 the general death rate was 11.1.

b. The infant mortality rate in Framingham for the previous ten year period was 81 per thousand born. In 1917 it was 73.

c. The tuberculosis death rate, corrected for non-residents and for errors in death certifications, averaged for 1906 to 1916 approximately 121.5 per 100,000. In 1917 the rate was 99.6.

CONCLUSIONS

The Framingham Community Health and Tuberculosis Demonstration aims to be not only an investigation and an *experiment* in community disease control; it should be also a *demonstration* of a community method, successful or not, as events prove, of disease prevention and health administration. The latter aspect especially will be of wide interest.

An accurate presentation of the findings of this social laboratory, as forecast in the above mentioned monograph series, is therefore of value. It may be that "the *results* of the Framingham experiment will be more important than the *result*." In any event, knowledge of the progress of the work may stimulate similar studies elsewhere.

Thus far the Health Experiment has apparently demonstrated the importance of sympathetic coöperation from local and outside agencies, as a basis for community social control over disease producing factors. It is the hope and anticipation of the committee that further developments will demonstrate that on a community basis, disease may be prevented and health created, thereby laying a permanent physical foundation for future social, economic, and spiritual evolution.

A TUBERCULOSIS SURVEY OF THE RESIDENTS OF SARANAC LAKE, NEW YORK[1]

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Tuberculosis is a disease of widespread distribution. Vitally related to this rather obvious fact is another of very great importance. Among supposedly healthy individuals there is prevalent a fear of personal infection by contact with tuberculous patients. This phthisiophobia has been a great drawback to the extension of knowledge and its application along preventive lines. Because of phthisiophobia the tuberculous person has been shunned, neglected and even persecuted.

Fear is born of ignorance. The fear of infection among the laity may be taken as a partial index of general ignorance concerning tuberculosis.

It is necessary that all possible data should be gathered and used in order that many questions relative to tuberculosis can be answered intelligently. In this way only can the educational campaign be advanced and prevailing ignorance combated.

Allowing for somewhat different hygienic conditions existent in health resorts, the fact nevertheless remains that much of general value can be obtained from a study of conditions in a resort frequented by tuberculous individuals who live with and among other residents with no attempt at segregation of the sick from the well.

In the present paper are presented the results of a tuberculosis survey of the residents of Saranac Lake, New York.

SARANAC LAKE AS A HEALTH RESORT

In 1876, Dr. E. L. Trudeau, suffering from pulmonary tuberculosis and having found his own health such that life in the city could not be endured, settled, with his little family, in the village of Saranac Lake, N. Y. At that time the village, to quote his own words, "consisted of a saw mill, a small hotel for guides and lumbermen, a school house, and perhaps a dozen guides' houses scattered about over an area of an eighth

[1] This work was done under a fellowship grant of the Edward L. Trudeau Foundation.

of a mile." The foregoing incident "marked the beginning of the now famous health resort known as Saranac Lake, which developed at first through a few pulmonary invalids that Dr. Loomis sent (to Dr. Trudeau) from time to time to try the effect of the winter climate" (1).

Gradually the village became a Mecca for individuals afflicted with tuberculosis, especially the pulmonary form, and from the humble beginning described by Dr. Trudeau Saranac Lake has grown to its present size,—a modern village of 5879 inhabitants, paved streets and municipal lighting, water and sewerage systems.

The village is located in three townships, one of which, Harrietstown, with an additional population of about 625, exclusive of summer residents, is included in the census figures here presented. The number of cases of tuberculosis found outside the corporate limits of Saranac Lake was too small to materially change any percentages listed.

PURPOSES OF THE SURVEY

Early in 1917 the state and local Boards of Health authorized a survey which should be, in real plan and scope, a study of conditions among the tuberculous residents of the district. The questions to be answered were of local and general interest. Briefly stated the purposes were:

1. To discover all cases of tuberculosis in the district.
2. To find and report all cases without local medical attendance.
3. To ascertain the indigenous morbidity and mortality from tuberculosis. From these figures it was hoped to arrive at some definite conclusion with regard to the actual basis of the fear of infection already mentioned. Relative figures of childhood infection were also desired.
4. For statistical reasons, to make possible a study of the history and progress of the disease and the present physical, social and economic status of all tuberculous individuals working, owning property, or residing permanently in the district; and also to note the presence or absence of a positive family history.
5. To observe the educational influences of the health resort with special reference to the development in all residents of a sane conception of the disease tuberculosis and its real dangers.

In answering the general questions it was important that observations cover a long period of time. In the forty odd years since its

inception as a health resort Saranac Lake has been the object of no like study; the figures therefore represent conditions covering a generation.

METHOD OF SURVEY

In order to make the survey as thorough and systematic as possible, it was deemed best to gather data by a careful house to house canvass and by personal interviews with the individuals from whom histories were desired. This was done without haste. Each house was visited. In all cases an effort was made to consult either the head of the family or some responsible person who possessed accurate knowledge of the family history.

In the village the census was made by streets and these checked off as completed. The accompanying map of the village shows the location of dwelling houses. Those marked with a cross show that one or more of the inmates gave a positive history of tuberculosis.

The roads through the township were covered by automobile. The camps on the shores and islands of the lakes were reached by boat; so that no part of the inhabited territory of the health district was omitted in the course of the work.

To open an interview the following questions were asked: 1. "Are there any persons living in this house who came to the village for their health?" 2. "Has any one in the family ever had tuberculosis or died from it?"

Names given in answer to the above questions were listed, at times rather arbitrarily, as transient or permanent residents. In general, transients were considered as those patients who were in the village only temporarily not keeping house and not working, those actively sick with tuberculosis, or any condition of ill health which had brought them to the village for recuperation. Under permanent residents were the native born and those who owned property in the village and were living "indefinitely" as residents of the district. Others classed as permanent residents were those who had come at one time for their health but were now in arrested or quiescent stages of their disease and thus able to work.

Further details concerning transients included the name of the local physician, if any, the home address, the length of residence in the village, and the marital history. From the permanent residents a complete history was taken, questions being asked as listed on the accompanying question sheet.

CHART 1

No._____

HEALTH CENSUS
of the RESIDENTS *of* SARANAC LAKE-HARRIETSTOWN CONSOLIDATED HEALTH DISTRICT

(1) Name_____ (2) Address_____

(3) Age____ (4) M.F. (5) S.M.W.____ (6) Race_____ (7) Physician_____

(8) Birthplace_____ (9) How long resident here_____ { Transient_____ Permanent_____

(10) Former places of residence_____

_____

(11) Occupations_____

Former_____ Income_____

Since residence here_____

Hours_____ Income_____

(12) Where resided since coming here:

Hotels _____ Cost of board_____

Boarding houses_____ Cost of board_____

Sanatoria or hospitals_____ Cost of board_____

Private houses_____ Cost of rent_____

Housing conditions_____

(13) State of health before coming here { Good_____ Poor_____ Illness_____ (14) T.B._____ (15) Suspected_____

(16) History of: Pleurisy_____ (17) Scrofulosis_____ (18) Hemoptysis_____

(19) Bronchitis or Catarrh_____ (20) T.bc. in sputum_____ (21) Bone or joint T.B._____

(22) Reasons for coming here: Health_____ Business_____

(23) How long since under medical care_____

Time from onset of disease to beginning care_____

NOTES: (Earning capacity, frequency of illness, etc.)_____

_____

_____

_____

BLANK CENSUS FORM
(Front)

CHART 2

FAMILY HISTORY

		LIVING			DEAD		
		Ages	Condition of Health	T.B.	Date and Place	Cause.	T.B.
(24) Parents	F.						
	M.						
(25) Husband							
(26) Wife							
(27) Brothers	1						
	2						
	3						
	4						
	5						
(28) Sisters	1						
	2						
	3						
	4						
	5						

	Names	Ages	Birthplace	Health*		Birthplace, Age		Meningit.	
(29) Children	1								
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								

EXPOSED TO T.B.			EXPOSED TO T.B.	
Parents or Other Relatives	Other Persons Boarders, etc.		Parents or Other Relatives	Other Persons Boarders, etc.

*Scrofulosis, enlarged tonsils and adenoids, malnutrition, conjunctivitis, etc.

NOTES

BLANK CENSUS FORM
(Back)

In all doubtful cases and in a very few where no interview could be obtained, the records of local physicians were consulted for data. Counter-checking of lists was also made by several of the older resident physicians in order to omit no known cases.

ATTITUDE OF THE PUBLIC

It was hoped to secure the coöperation of the people both by the questions asked and the method of interrogation. In general this hope was realized. In an ordinary community such queries would doubtless lead to meagre results. Because of local conditions to be mentioned later there was present little object for concealment of a history of tuberculosis. Practically without exception the inspector was met with apparent frankness and with at least tolerant coöperation. The number of individuals whose egotism was large enough to hide their sense of civic duty was very small.

ACCURACY OF DATA

The survey was made by one inspector and a carefully worked-out plan was consistently followed. Except in cases checked from records of local physicians all the data presented came from individuals interviewed. It was not possible to check answers by clinical or laboratory methods. Allowance therefore, must be made for personal variations among the persons from whom histories were taken. It can well be believed, however, that the following figures represent conditions as they existed at the time the survey was made.

TOTAL NUMBER OF CASES LISTED

Any statement of totals must be accompanied by an explanation of local conditions. Saranac Lake is a health and pleasure resort. As such its population is varying constantly as new patients come to the village and old ones leave. The vernal and autumnal changes are most marked. The present survey was begun in May, 1917, subsequent to the spring exodus and the number of transients listed will necessarily be somewhat low. Those entered as permanent residents on the average will vary but little throughout the year. The census was completed in September, 1917.

Briefly stated results were as follows:

Transients listed as tuberculous	860
Permanents listed as tuberculous	441
	1301
Duplicates	14
Total	1287

This gives slightly less than 20 per cent of the total population of the health district with a definite personal or family history of past or present tuberculosis.

CASES WITHOUT LOCAL MEDICAL ATTENDANCE

No figures are available of work exactly comparable in other communities. The tuberculosis survey of the State Board of Health of Michigan has attempted to locate new cases of the disease by means of publicity and public examinations. Review of the work for the first year showed that "of the total number of positive cases only 2.2 per cent had been previously reported to the State Board of Health—less than 4 per cent knew anything about" (2) the disease existent within themselves.

In the present survey figures show that nearly all the tuberculous were aware of their disease and a total of only 81, or slightly over 6 per cent, had not consulted a local physician. Of these the positive cases were reported to the Board of Health by the inspector. Most of the individuals so reported had been diagnosed by physicians in other localities and sent to the mountains for the diagnosed condition. Of those with no local doctor 37 were sanatorium ex-patients; 5 were on the waiting list to enter some sanatorium for treatment; 6 had never been diagnosed as positively tuberculous; and 7 denied tuberculosis but said they came for their health to the village,—2 for operation (appendectomy), 1 for "nervous" condition, and 4 for "rest." These figures show that a total of only 26 admittedly tuberculous individuals, with no previous treatment, had failed to consult a physician since residence in the health district. These patients were advised to secure local medical attention and were instructed as to general hygiene and the proper disposal of sputum, etc.

INDIGENOUS MORTALITY AND MORBIDITY

A study of conditions in Saranac Lake allows a fairly definite conclusion to be drawn concerning the logic of the fear of infection expressed by the laity. In a tuberculosis health resort a concentration of infectious foci would apparently increase the likelihood of clinical manifestations of the disease even in spite of often better hygienic surroundings.

Although comparable surveys are not very numerous, certain studies have been made elsewhere by other observers. Some of these are of present interest.

A compilation by von Lindheim (3) of statistics from European health resorts establishes the fact that tuberculosis has not increased among the native population. Indeed, in consequence of the better nourishment of the population since the rise of the health resorts, and the preventive measures taken, it has in many instances decreased.

Aebi (4), in a laborious examination of the question whether, after numerous tuberculous patients have resided in a place, the mortality from tuberculosis has increased or not, has proved in the case of Davos (a Swiss tuberculosis resort), after examination of the census returns and the register of deaths, that the population in and around a health resort of consumptives is not exposed to increased danger of infection. Aebi's investigations covered the years 1847–1896. Owing to its situation which cuts it off from the outside world, Davos is especially suited for such an investigation. Aebi found that no increase had taken place in the mortality from tuberculosis.

In statistics extending over the years 1876–1900 the Davos *Curverein* has shown that of 648 deaths in Davos during this period only 36 were due to tuberculosis, of which 7 cases were certainly not contracted at Davos (5).

S. G. Bonney (6) writing on the indigenous mortality in the state of Colorado, concludes that the statistics gathered should lead to caution in stating undue danger to residents of health resorts. The experience of the majority of Colorado physicians shows relatively few cases of tuberculosis developing among the native population of the health resorts of the state.

Fishberg (7) advancing the theory of adult immunity to exogenous infection discusses the rarity of tuberculosis among hospital workers whose duties make necessary their close daily contact with active, open cases of the disease.

Baldwin (8) concludes: "The natural infection of human beings takes place largely in childhood and increases the resistance to subsequent disease in a large measure . . . . Adults withstand exogenous reinfection under extreme exposure, partly on account of slight infections in earlier life and favorable occupations, environment and nutrition."

The annual report of the local health board for 1916 (9) shows a total of 18 deaths from pulmonary tuberculosis among the native population of Saranac Lake during the ten years' period previous to 1916 and none from 1911 to 1916. During 1916 six additional deaths were recorded, these occurring in long-standing cases of the disease. During 1916 there were 183 deaths from pulmonary tuberculosis among the transients in the village. The foregoing figures are for the incorporation of Saranac Lake and do not include the remainder of the Harrietstown township.

Indigenous mortality

CASE NUMBER	YEARS IN VILLAGE	YEARS SINCE DEATH	TUBERCULOUS FAMILY HISTORY FOR LIVING MEMBERS
163	29	?	0
174	25	18	0
192	25—native	6	0
205	27	16 months	0
396	15—native	18 months	0
395	34	2	0
397	18	9	0
375	63—native	10	0
381	3	2	?
398	40	6	?

Ten families were found in which members had developed tuberculosis and died while residents of the village. Of these, three were born in the village. No cases were found in other members of the family of the deceased, although two gave a questionable family history.

To the above might be added case 252. The husband of the family was said to have developed "stomach" tuberculosis after coming to the village. He died in Los Angeles. Widow and children, all well, are still living in the village.

Cases 319 and 378 were of local women who married tuberculous patients from outside the village. The husbands are both dead. Their children are living and well.

Indigenous morbidity

CASE NUMBER	YEARS IN VILLAGE	YEARS IN VILLAGE BEFORE ONSET OF SICKNESS	FAMILY HISTORY OF TUBERCULOSIS
360	26	?	0
193	26	?	Positive
169	17—native	16	0
173	28—native	5 (spine)	0
141	25	24	0
51	16	8	0
38	10	8½	?
25	13	10	Positive
17	9	5	Positive
29	12	11	0
315	6	5	0
370	16	13	Positive
377	21—native	15	Positive
407	17—native	15	0
88	8	5	Positive
304	4½	¼	Positive

The above table shows that 16 cases were found which had lived in the village for periods of time varying from birth to 28 years. These had lived from 3 months to 24 years before manifestations of clinical tuberculosis were present. Only 4 cases can be called strictly native since only this number was born in the village. Many of the other cases may well have been imported in latent form and later developed clinical disease. Only 1 of the 4 native cases showed a positive family history. One living case of possible infection while in the village was No. 219, not listed in the above table. The individual was born in Saranac Lake forty-two years ago. The family history was positive, the father, one brother and one sister having had tuberculosis. At the age of thirty the patient left the village and was away eight years. While away clinical tuberculosis developed and the patient returned to the village for his health. At present the disease is apparently quiescent.

The foregoing results show a total of 26 cases of tuberculosis mortality and morbidity developing activity of the disease after the individual became a resident of the village. The total of 4 living cases among the native born is thus 0.3 of 1 per cent of the total cases recorded by the survey.

Because Saranac Lake is a resort for tuberculous patients, there is present less desire to withhold any information relative to a history of tuberculosis. Low figures are thus all the more noticeable.

From these figures we must believe that if danger of infection is so great the present survey gives but little positive proof of such a possibility.

Various possible factors might be mentioned why the mortality and morbidity figures are so low; lower than in other communities of the same average size.

Although there is some difference of opinion, authorities in general agree that climate is of doubtful value in protecting against the development of the disease unless the manner of life of the individual is favorable as well.

Saranac Lake is a closely built village as the enclosed map indicates. Because of the short growing season agriculture is not generally followed. To favor good living conditions may be cited the fact that in the village are few instances of extreme poverty, the majority of families belonging to the moderately well-to-do class. Industrial occupations involving indoor work are few. The general intelligence of the people on subjects relating to tuberculosis is very high. Open air sports are common, for instance, boating, hunting, fishing, skating, etc.

Aside from the low incidence of indigenous tuberculosis we find also a minimum of epidemic diseases such as diphtheria, scarlatina, typhoid fever and pneumonia. Intestinal diseases are rare.

Thus we see that apart from any climatic consideration the general hygienic method of living of the people is conducive to marked freedom from the common communicable diseases. Outside of tuberculous families the infection of the resident population is less than in the average community. This is in complete accord with observations already noted.

INCIDENCE OF TUBERCULOSIS IN CHILDREN

Census returns from the present survey show but few cases in which clinical tuberculosis has manifested itself in children. A consideration of children under fifteen years is shown in the following table.

This gives a total of 9 cases of incident morbidity in children under fifteen years. The pulmonary form is present in 3 cases; family 25 showing 2 children actively sick. At the time of the survey these 2 children were being treated at a nearby sanatorium. The present health of the remaining 6 is fair with the suspicious cases showing more symptoms of active disease. The family history is in all cases positive but in several the second case is no longer active.

Morbidity (15 years and under)

CASE NUMBER	AGE	FORM OF DISEASE				
		Pulmonary	Adenitis	Bone	?*	Peritonitis
	years					
39	13	0	Positive	0	0	0
402	11	Positive	0	0	0	0
25	13 and 10	Positive	0	0	0	0
87	7	0	0	0	Positive	0
56	6	0	0	0	Positive	0
285	15	0	0	0	Positive	0
120	9	0	Positive	0	0	0
393	13	0	0	0	0	Positive

* The child is doing "poorly" and parents suspect tuberculosis. Family history is positive.

It is well to state again that these figures are based on parental history and not on medical records. A summary of a recent report of the school physician of the village follows, the figures in this case being only for children under seven years of age:

Number of pupils examined	137
Tonsils and cervical lymph nodes enlarged	17
Tonsils enlarged	10
Cervical nodes enlarged	8
Acute colds	8
Advanced teeth decay	15
Discharging ears	2
Râles, harsh breathing	1
D'Espine's sign	0

In a thorough physical examination of 119 children in Framingham, Mass., (13), the following results are reported:

Enlarged tonsils and lymph nodes	82
Enlarged tonsils alone	11
Enlarged cervical nodes alone	17
Acute colds, coryza, etc.	14
Advanced teeth decay	5
Ear discharge	3
Râles, harsh breathing, (as a result of acute respiratory process)	11
Positive D'Espine's sign	7

It is fair to add that all of these 119 children in Framingham, Mass., had reacted positively to a Pirquet tuberculin test previous to their physical examination. Ninety-seven of these had entirely normal chests.

An attempt has been made to ascertain the relative incidence of tuberculosis among children in families with one parent tuberculous or where both parents had a positive present or past history of clinical disease. For the first class table 10 summarizes the results. From this it will be seen that of the married males 92 have children. Among these are 3 families with positive tuberculosis in the children; 2 with questionable diagnoses; 2 dead with positive tuberculosis and 1 dead with probable tuberculosis. Of 48 married females 32 have children. In these 32 families there are no children living with positive tuberculosis, but 2 with questionable disease. Two of these families have children dead of tuberculosis. Among the children of 6 widowers there has been 1 death from tuberculosis and among the children of 5 widows with the disease themselves no cases were found.

The above gives a total of 151 families in which one parent has had tuberculosis. Among the children we find 3 positive living cases; 4 questionable; 5 positive cases in patients now dead; and 1 questionable, now dead.

Considering those families in which husband and wife are both tuberculous we find 42 such in the district (table 11). Twenty-two, or slightly less than 50 per cent of these, have one or more children in the family with a total of 24 children living. Tuberculosis among the children is present in only 3 families and these are not definite cases. Two families in this number reported the loss of a child from tuberculosis.

There are 260 children in families having one or both parents tuberculous. In these families the cause of death in children under fifteen years has been tuberculous meningitis in 4 cases dying in the village. Deaths occurring away from the village include 2 from tuberculous meningitis, 1 from spinal tuberculosis and 2 with the exact cause not known but with the likelihood of tuberculous meningitis.

In these cases of positive history in one or both parents reference is made only to clinical tuberculosis in the children. An interesting study would be to apply tuberculin tests to the children in these families and determine the relative frequency of tuberculous infection in the two series and in a control of negative history families. Such an experiment is proposed in the Community Health and Tuberculosis Demonstration now being conducted at Framingham, Mass.

STUDY OF CASE HISTORIES

Four hundred and eight individual histories were outlined in accordance with the enclosed history sheet. Thirty-three were added by counter-checking with records of local physicians, making a total of 441 residents with positive personal or family history of tuberculosis.

PREVIOUS HISTORY OF TUBERCULOSIS

Nineteen individuals were found who admitted a previous attack of active tuberculosis. These persons had recovered some time before coming to the district to live. They had come in search of work and not for their health.

The present occupations of these 19 were as follows: housewife, 4; meat cutter, 1; nurse, 6; pastry cook, 1; and 1 each of the following, dishwasher, clerk, dressmaker, watchmaker, night watchman, waitress, none.

Eleven of the above were sanatorium ex-patients.

ANALYSIS OF HISTORIES

Complete histories were taken of 304 individuals who went to the district with a positive diagnosis of personal tuberculosis. These persons are now working, owning property, or residing permanently in the health district. Data concerning these cases have been tabulated in the appended pages. By means of these tables we are able to study the history and progress of the disease; present physical and economic condition of the tuberculous persons, and some elements of the importance of negative or positive family history.

AGE

In a total of 304 approximately 66 per cent, or 207, are between the ages of twenty-five and forty-five. Only 5 cases are below twenty years of age, and none younger than fifteen years.

SEX

Division by sex shows 197 males and 107 females. This difference might be explained by the possibility that males find easier employment

after recovery from their active tuberculosis and remain in the village, while the females leave to return to their families.

TIME OF RESIDENCE IN THE DISTRICT

Nearly 80 per cent of the cases listed are of individuals who have resided in the district over two years. Two gave their time of residence as over thirty years (Table 1).

TABLE 1

Time of residence in village

	AGE GROUPS										TOTALS
	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	
Male	2	10	26	30	46	32	25	19	6	1	197
Female	3	11	16	22	15	20	10	6	3	1	107
Up to 5 months	1	4	3	2	2	3	0	0	0	0	15
6 to 11 months	0	4	1	3	5	3	0	0	0	0	16
12 to 17 months	0	1	6	6	2	1	4	0	0	0	20
18 to 23 months	0	0	1	0	2	3	2	1	0	0	9
2 to 4 years	4	7	16	9	17	11	5	2	1	0	72
5 to 9 years	0	2	13	24	17	10	8	4	1	0	79
10 to 19 years	0	2	2	7	14	16	11	9	4	0	65
20 to 29 years	0	0	0	0	2	5	4	9	3	0	23
Over 30 years	0	0	0	0	0	0	0	0	0	2	2

DISTRIBUTION BY BIRTHPLACE

Table 2 shows that New York State leads with 134 native born citizens, once actively tuberculous, now residing in the health district. Next is Pennsylvania with 20 and Massachusetts with 16. Of the natives of other countries Canada has 16, England and Germany, 8 each, Ireland 7, and other countries from 1 to 4 each. Geographical contiguity is ample explanation for the relation of the figures given.

TABLE 2

Birthplace by state or country

	AGE GROUPS										TOTALS
	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	
Connecticut	0	0	0	0	5	1	2	1	0	0	9
Georgia	0	0	0	0	0	1	0	0	0	0	1
Illinois	0	0	1	0	0	0	0	0	0	0	1
Iowa	0	0	0	0	0	1	0	0	0	0	1
Kentucky	0	1	1	1	0	0	0	0	0	0	3
Maryland	0	0	1	0	1	2	1	0	1	0	6
Maine	0	0	2	0	0	0	1	0	0	0	3
Massachusetts	0	0	4	7	1	2	0	2	0	0	16
Michigan	0	1	0	2	1	0	2	0	0	0	6
Missouri	0	0	0	0	2	2	0	0	0	0	4
North Carolina	0	0	1	0	1	0	0	0	0	0	2
New Hampshire	0	0	0	0	0	0	1	0	0	0	1
New Jersey	0	2	2	3	3	1	1	1	0	0	13
New York	3	10	19	19	27	28	11	8	7	2	134
Ohio	0	1	0	1	2	3	1	3	0	0	11
Pennsylvania	1	1	4	4	2	2	3	3	0	0	20
Rhode Island	0	1	0	0	0	0	0	0	0	0	1
South Carolina	0	0	0	0	1	0	0	0	0	0	1
Tennessee	0	0	0	1	0	0	0	0	0	0	1
Virginia	0	0	1	0	1	1	1	0	0	0	4
Vermont	0	0	0	1	0	1	0	1	0	0	3
Wisconsin	0	0	0	1	0	0	0	0	0	0	1
West Virginia	0	0	1	0	0	0	0	0	0	0	1
Austria	0	1	0	1	1	0	0	0	0	0	3
Bohemia	0	0	0	1	0	0	0	0	0	0	1
Canada	0	1	3	2	4	2	2	2	0	0	16
England	0	0	0	1	1	0	4	1	1	0	8
Germany	0	1	0	0	2	2	1	2	0	0	8
Ireland	0	0	0	1	1	2	2	1	0	0	7
Italy	1	0	0	0	0	0	0	0	0	0	1
Japan	0	0	1	0	0	0	0	0	0	0	1
Nova Scotia	0	0	0	1	0	0	0	0	0	0	1
Russia	0	0	0	1	2	0	1	0	0	0	4
Scotland	0	0	0	2	1	0	0	0	0	0	3
											294

RACE BY PARENTAGE

Race by parentage (Table 3) gives a total of 210, or 67 per cent of individuals both of whose parents were born in the United States. Canadian and German born parents number 17 each, or slightly more than 5 per cent.

TABLE 3

Race by parentage

	AGE GROUPS										TOTALS
	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	
Austrian	0	1	1	1	1	0	0	0	0	0	4
American	3	17	28	35	38	40	22	19	7	1	210
Bohemian	0	0	0	1	0	0	0	0	0	0	1
Canadian	0	1	3	3	4	2	2	2	0	0	17
English	0	0	1	1	1	0	4	0	1	0	8
German	0	1	2	1	6	3	2	2	0	0	17
Irish	0	0	2	1	4	4	2	1	0	0	12
Italian	1	0	0	1	0	0	0	0	0	0	4
Japanese	0	0	1	0	0	0	0	0	0	0	2
Russian	0	0	0	1	2	0	1	0	0	0	1
Scotch	0	1	0	4	1	0	0	0	0	0	4
South American	0	0	0	0	1	0	0	0	0	0	6
Welsh	0	0	1	0	0	0	0	1	0	0	1
American-Russian	0	0	1	0	0	0	0	0	0	0	2
Canadian-American	0	0	0	1	0	0	0	0	0	0	1
English-American	0	0	0	0	0	1	0	0	1	0	1
German-American	0	0	1	0	2	2	0	0	0	0	5
German-Irish	0	0	0	0	0	0	1	0	0	0	1
Irish-American	1	0	1	2	0	0	1	0	0	0	5
Irish-Canadian	0	0	0	0	0	0	0	0	0	1	1
Scotch-American	0	0	0	0	1	0	0	0	0	0	1

HOUSING CONDITIONS

It has been said that, "Bad living quarters form one of the chief threads in the snarl of social facts in which individual and family life is set. . . . The house is the equipment that must be made to right personal habits; to build up and not pull down hygienic life in families. . . . . To gain ultimately, relatively complete control of tuberculosis, serious housing defects such as those which now exist must be shut out from all construction." (2)

The Village of Saranac Lake is not a so called "Spotless Town" and is not free from poor housing conditions. However, as concerns the tuberculous patients, few unsatisfactory places could be found. In many parts of the village the house with no sitting-out and sleeping-out porches is the exception rather than the rule.

Less desirable conditions are found in many of the downtown business blocks and apartment houses. Rooms and small suites, while not all overcrowded, are far from ideally located for housing tuberculous

patients. Proximity to the main travelled business streets detracts from the value of the porches when present. In some cases inside hallways and rooms are dark and crowded. A few shacks on the outskirts are not desirable residences. Downright squalor made itself most apparent in one log cabin. However, if we may believe the word of the dwellers in these places, no cases of tuberculosis were present in the families.

TABLE 4

Housing

		AGE GROUPS										TOTALS
		15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	
Where lived....	Hotel.....	2	1	6	3	6	10	5	4	1	0	38
	Boarding house.	4	13	27	34	35	28	19	10	3	1	174
	Private.....	5	12	33	38	47	43	27	23	7	2	237
Present housing conditions	Good.....	4	19	37	43	47	47	28	22	7	2	256
	Fair.....	2	2	4	6	9	4	5	3	1	0	36
	Poor.....	0	0	0	0	0	0	0	0	0	0	0

NOTE.—Housing conditions are listed according to light, fresh air and general cleanliness of premises.

OCCUPATIONAL DATA

As indicative, in general, of the effect the clinical manifestation of tuberculosis had made in the individuals, questions were asked concerning the earning capacity, income and nature of work (table 5).

TABLE 5

Earning capacity, income, etc.

		AGE GROUPS									TOTALS	
		15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	
Number.....		5	21	42	52	61	52	35	25	9	2	304
Same work as before.....		0	4	9	17	25	26	17	11	5	1	115
Income	More.....	1	5	6	2	4	6	2	1	0	1	28
	Same.....	0	2	3	6	6	4	2	2	0	0	25
	Less.....	0	1	14	11	21	12	12	6	3	0	80
	Private*.....	4	8	15	23	19	22	12	15	4	1	122 255
Earning capacity	Full.....	1	11	26	26	37	34	21	16	7	2	181
	Part.....	1	3	7	13	8	7	4	2	1	0	46
	None.....	3	7	9	13	16	11	10	7	1	0	58 285

* Private income means sufficient to care for individual and family regardless of occupation.

EARNING CAPACITY

Of 285 answers it was found that 58 were still possessed of no earning capacity (5 of these did non-remunerative work at home); 46 were able to work part time; and 181, or about 63 per cent, were working full time. As all but 12 of these latter are in the group of patients who had lived more than two years in the village the return to full earning capacity may be taken as a fair test of the present arrest or quiescence of the disease.

RELATIVE INCOME

It was hoped at first that absolute figures could be obtained relative to income before and after the outbreak of tuberculosis. This proved impracticable for personal reasons and only relative statements were elicited. However, 28 stated their income to be more than it had been before sickness. If we except several who were in school before being sick the number is small of those able to earn more after recovery. Twenty-five reported their income as practically the same as before sickness. Eighty stated that their income was decidedly less than before. In 122 cases no relative statement was obtained; but the income was deemed sufficient for the individual and for members of the family. Such was designated as "private." On the whole data concerning the incomes of patients were very unsatisfactory.

OCCUPATIONS

Of the total now working, 115 are employed in the same occupation as before their illness with tuberculosis. Doubtless this number would be larger except for the limitations of the village along certain occupational lines. The occupations most frequently listed are (tables 6 to 8):

	BEFORE	NOW
Boarding-house	0	20
Bookkeeper	17	15
Business	21	19
Clerk	32	15
Housework	39	44
Nurse	17	25
Physician	11	13
School	17	0
Stenographer	13	9
Teacher	9	5

In most cases of increase or decrease it will be noted that the nature of the district as a health resort and the occupations in it are the cause

TABLE 6

Occupations before sickness and now

	AGE GROUPS																				TOTALS	
	15–19		20–24		25–29		30–34		35–39		40–44		45–49		50–54		55–59		60–64			
	Before	Now	Before	Now	Before	Now	Before	Now	Before	Now	Before	Now	Before	Now	Before	Now	Before	Now	Before	Now		
Architect	0	0	0	0	0	0	1	1	0	0	1	1	1	1	0	0	0	0	0	0	3	3
Artist	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Baker	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Banker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
Barber	0	0	0	0	0	0	0	0	1	1	2	2	2	1	0	0	0	0	0	0	5	4
Bartender	0	0	0	0	0	1	1	1	2	2	0	0	0	0	0	0	0	0	0	0	3	4
Boarding-house	0	0	0	0	0	1	0	3	0	3	0	4	0	6	0	3	0	0	0	0	0	20
Bookkeeper	0	0	0	0	2	3	4	4	6	1	2	5	0	0	2	1	1	1	0	0	17	15
Business	0	0	0	1	1	6	2	3	5	4	5	4	2	0	4	1	2	0	0	0	21	19
Butcher	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Carpenter	0	0	0	0	0	0	1	1	0	1	1	0	1	1	1	1	0	0	1	0	5	4
Carpetweaver	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Chauffeur	0	0	0	2	0	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	6
Chemist	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Cigar-maker	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
Civil engineer	0	0	0	0	1	1	1	0	2	2	1	1	0	0	1	0	0	0	0	0	6	4
Clergyman	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	2	2
Clerk	0	0	2	1	9	5	6	4	8	2	3	1	3	1	1	0	0	1	0	0	32	15
Coachman	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
Contractor	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
Cook	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Dentist	0	0	0	0	0	0	0	0	1	1	0	0	2	2	0	0	0	0	0	0	3	3
Dressmaker	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Druggist	0	0	0	0	0	0	0	0	2	2	0	0	0	1	0	0	0	0	0	0	2	3
Electrical engineer	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Electrician	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
Elevator operator	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Factory	0	0	0	0	0	0	1	0	2	0	1	0	0	0	0	0	0	0	0	0	4	0
Farmer	0	0	0	0	0	0	0	0	0	1	3	0	1	0	0	1	1	0	0	0	5	2
Gardener-greenhouse	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	1	0	4
Hotel	1	0	1	0	2	0	1	0	2	1	0	0	0	1	1	0	0	0	0	0	8	2
Housework	1	1	1	2	4	8	8	9	4	6	11	10	5	4	2	1	2	2	1	1	39	44
Insurance	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
Local salesman	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	1	0	0	0	0	2	2
Laboratory worker	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
Laborer	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	3
Lawyer	0	0	0	0	0	0	0	0	0	0	2	0	1	1	0	0	0	0	0	0	3	1

of the change, for instance, whereas none of the individuals kept a boarding house in the municipality where they formerly lived, 20 are now in that occupation. Many are now practical nurses who were before clerks, stenographers, etc. Under business have been rather arbitrarily grouped those engaged in managerial office or store work.

TABLE 6—*Continued*

	AGE GROUPS																		TOTALS	
	15–19		20–24		25–29		30–34		35–39		40–44		45–49		50–54		55–59		60–64			
	Before	Now	Before	Now	Before	Now	Before	Now	Before	Now	Before	Now	Before	Now	Before	Now	Before	Now	Before	Now		
Letter carrier	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Longshoreman	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Magazine subscriptions	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Manicurist	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
Mechanic	0	0	0	0	0	0	1	0	1	0	1	0	2	1	1	0	0	0	0	0	6	1
Milliner	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	2	1
Missionary	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Moulder	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Musician	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
None	0	3	4	6	5	6	0	7	3	8	0	8	2	7	1	7	0	1	0	0	15	53
Nurse	0	0	1	2	2	3	4	6	1	3	6	8	1	1	1	1	1	1	0	0	17	25
Telephone or Telegraph operator	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	3	2
Painter	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	1	2
Physician	0	0	0	0	1	1	1	1	4	5	1	2	2	2	1	1	1	1	0	0	11	13
Photographer	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2
Plumber	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	2	2
Policeman	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Postmaster	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Printer	0	1	0	0	0	0	0	0	2	1	1	1	1	1	0	0	0	0	0	0	4	4
Railroad	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	2	1
Reporter	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Road inspector	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Rubber planter	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
School	3	0	6	0	1	0	3	0	2	0	2	0	0	0	0	0	0	0	0	0	17	0
Sculptor	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Stenographer	0	0	2	1	3	1	2	3	3	2	1	0	2	1	1	1	0	0	0	0	13	9
Tailor	0	0	0	0	0	0	0	0	2	2	0	0	0	0	1	0	0	0	0	0	3	2
Teacher	0	0	0	0	2	1	2	0	1	1	0	0	2	1	2	2	0	0	0	0	9	5
Theatrical	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Traveling salesman	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	2	2
Undertaker	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	2
Writer	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1

MEDICAL HISTORY

Of a total of 298 answers, 196 gave a history of general good health previous to the outbreak of clinical tuberculosis; 214, in a total of 301, gave a positive history of pleurisy; only 24 out of 304 had shown any scrofulosis; hemoptysis had been present in 187 in the same total; 222 reported positive sputum at some stage of the disease, 27 questioned positive sputum, and only 55 stated themselves to be sputum-free cases. Bone or joint tuberculosis was present in 5 out of 304 cases. Bronchitis was reported in 33 cases and catarrh in 45 out of a total of 304.

Of the histories taken 105, or about one-third of the total, were of patients who had undergone sanatorium treatment for their tuberculous condition.

Of interest is the time period which elapsed between the onset of positive symptoms of tuberculosis and beginning care on the part of the patient. Fourteen reported beginning care in less than one week, many of these being cases starting with hemorrhage as the initial symptom. Forty-five instituted care in from one week to three months; 72 allowed the disease to progress from six months to one year; 34 from one to two years; and 60, or 26 per cent of the total of 225 responding to this question, had waited two years or over to begin treatment for their tuberculosis. It is unfortunately true that this interval represents, in a large proportion of cases, the time before the disease condition was recognized or diagnosed by the physician in attendance.

Perhaps of more present interest is a record of the time since these ex-patients had been under the care of a physician.

Two hundred and seventy-nine answered the foregoing question. Of this number 94, or approximately 33 per cent, were under present medical care; 87 had not had medical attendance for periods of from two months to two years; 19 not for three years; 11 for a period of four years; 10 for five years; and 36, or 13 per cent had been six years or over without medical care.

On first thought these figures may not appear consistent with the large number of patients now restored to full earning capacity. However, in many who reported themselves under a doctor's care it was not easy to learn whether the attendance was necessary because of the previous tuberculous condition or to some more recent trouble possibly not related etiologically to the tuberculosis itself.

TABLE 7

Medical history

			AGE GROUPS									
			15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	
Health previous to breakdown	Good		3	12	19	35	44	33	20	19	9	2	196
	Sick		2	9	20	14	17	19	15	6	0	0	102
Major signs and symptoms	Pleurisy	Positive	3	12	24	40	42	43	25	17	8	2	214
		Negative	2	9	18	12	19	9	10	7	1	0	87
	Scrofulosis	Positive	1	3	5	4	5	4	2	0	0	0	24
		Negative	4	18	37	48	56	48	33	25	9	2	280
	Hemoptysis	Positive	3	11	23	29	35	36	25	18	5	2	187
		Negative	2	10	19	23	26	16	10	7	4	0	117
	Positive sputum		2?	3?	4?	3?	3?	8?	3?	1?			27?
				14	27	37	49	39	29	17	8	2	222
	Negative sputum		3	4	11	12	9	5	3	7	1	0	55
	Bone or joint	Positive	1	0	0	0	1	1	2	0	0	0	5
		Negative	4	21	42	52	60	51	33	25	9	2	299
	Bronchitis	Positive	0	6	9	12	22	22	8	10	3	1	33
		Negative	5	15	33	40	39	30	27	15	6	1	271
	Catarrh	Positive	1	9	13	21	25	19	13	8	4	2	45
		Negative	4	12	29	31	36	33	22	17	5	0	259
Ex-patients sanatorium			1	8	12	24	22	17	10	10	1	0	105
Time from onset to beginning care	0 to 1 week		2	0	2	3	0	1	5	1	0	0	14
	1 to 3 weeks		0	1	2	1	9	2	0	1	0	0	16
	1 to 2 months		2	3	2	4	10	2	3	2	1	0	29
	3 to 5 months		0	1	1	8	10	5	3	5	1	1	35
	6 to 11 months		0	2	5	2	9	9	5	3	2	0	37
	1 to 2 years		0	2	3	9	5	10	4	0	1	0	34
	2 years and over		1	5	7	11	9	11	11	2	2	1	60
Time since under medical care	Now		2	9	14	18	19	13	12	6	0	1	94
	2 to 11 months		2	8	7	9	9	9	4	3	3	0	54
	1 year		1	1	5	7	7	6	3	2	1	0	33
	2 years		0	1	1	6	4	5	2	2	1	0	22
	3 years		0	0	5	2	3	4	2	2	1	0	19
	4 years		0	0	3	3	2	2	1	0	0	0	11
	5 years		0	2	1	2	2	0	0	2	1	0	10
	6 years and over		0	0	4	1	8	8	8	6	0	1	36

FAMILY HISTORY

The importance of family infection as a factor in the spread of tuberculosis, heredity, inherited tuberculous diathesis, tuberculosis as a house disease, the tuberculous in the home, etc., etc.,—all these are problems which have crowded tuberculosis literature with voluminous writings. No attempt can be made here to even review the general literature on the subject of family infection. A few papers will be mentioned in connection with figures gathered in the present survey.

The first statement of totals obtained in this census must inevitably be but another proof of the ubiquity of the tubercle bacillus and the resulting difficulties in tracing sources of infection. Of the 304 histories of positive tuberculosis cases 186, or about 61 per cent, were not able to give any history of family infection. In only a few was there obtained a plausible story of the possible source of the disease in any particular individual of the family group.

These figures tally very closely with those quoted by Hazen (10) who found 62 per cent of cases with no tuberculosis in the immediate ancestors. Dock and Chadbourne (11) in an analysis of 100 cases of chronic pulmonary tuberculosis found no history of tuberculosis in the parents in 74 families, and 61 in which no other member of the family was affected save the patient under treatment.

Of our remaining cases 107 gave a definite history of other cases within their own families and in 7 there was a question, with the balance in favor of a positive case.

Table 8 is of interest as showing the prevalence of tuberculosis in other members of the family besides the individual from whom the history was taken.

MacCorison and Burns (12) have discussed the rôle of "family clusters" in the prevalence of pulmonary tuberculosis. They present charts to show families in which more than one individual show clinical tuberculosis. These writers conclude that a study of their charts "would lead us to believe that the domiciliary distribution of tuberculosis may be due wholly or in part to the establishment of foci of infection following carelessness of individuals, usually adult, open cases of the disease. The swiftest channels for the spread of disease and furtherance of its activity are through the family lines."

In the survey under present discussion, from the total of 107 families with positive tuberculosis histories, we find a second member with the

disease as follows: brother tuberculous in 23 families; sister in 20 families; mother in 16 and father in 9 families; a total of 68 families in which tuberculosis is present in another member besides the one from whom the history was taken.

In 13 families a brother and sister were tuberculous in addition to the person interviewed; mother and father in only 3; sister and mother in 4; father and sister in 2. In 2 families 5 members were tuberculous; in 9 families 4 members each showed positive tuberculosis.

TABLE 8

"Family clusters" tuberculosis in family

	AGE GROUPS										TOTALS
	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	
Father	1	1	1	0	2	1	1	1	1	0	9
Father-brother	0	0	0	1	1	0	0	1	0	0	3
Father-sister	1	0	0	1	0	0	0	0	0	0	2
Father-mother-brother	0	0	0	1	1	0	1	0	0	0	3
Father-mother-sister	0	0	0	0	0	1	0	0	0	0	1
Father-brother-sister	0	0	0	0	0	3	0	0	0	0	3
Father-mother-brother-sister	0	0	0	0	0	1	0	0	0	1	2
Mother	0	3	3	2	4	1	1	1	1	0	16
Mother-brother	0	0	1	0	0	2	0	0	0	0	3
Mother-sister	0	1	0	0	1	0	1	1	0	0	4
Mother-brother-sister	0	1	0	0	0	0	0	1	0	0	2
Mother-father	0	1	1	1?	0	1?	1	0	0	0	3
											2?
Brother	0	0	3	6	8	1?	4	2	0	0	23
					2?		1?				4?
Sister	0	2	4	4	3	4	3	0	0	0	20
Brother-sister	0	0	2	4	2	1	1	1	1	1	13
			1?								1?
Total positive	2	9	15	19	22	14	13	8	3	2	107
			1?	1?	2?	2?	1?				7?
Total negative	3	12	26	32	37	32	21	17	6	0	186

TABLE 9

Family morbidity and mortality from tuberculosis 293 cases

		AGE GROUPS																		TOTALS	
		15–19		20–24		25–29		30–34		35–39		40–44		45–49		50–54		55–59		60–64			
			T.*		T.		T.		T.		T.		T.		T.		T.		T.		T.		T.
Father	Living	2	0	13	0	12	0	22	0	21	1	7	0	3	0	1	0	0	0	0	0	81	1
	Dead	3	2	6	2	29	2	27	3	38	3	43	6	31	3	22	2	9	1	2	1	210	25
Mother	Living	5	0	11	1	29	0	30	0	29	1	22	2	12	1	7	0	0	0	0	0	145	5
	Dead	1	0	9	5	12	5	20	3	28	5	27	4	23	3	17	3	9	1	2	1	148	30
Husband	Living	1	0	2	1	6	4	13	5	8	2	10	3	4	1	2	0	1	0	0	0	47	16
	Dead	0	0	0	0	1	1	2	2	0	0	4	2	0	0	1	0	1	1	1	0	10	6
Wife	Living	0	0	1	1	15	2	23	3	37	5	26	2	23	3	12	2	5	0	1	0	143	18
	Dead	0	0	0	0	1	1	0	0	2	2	0	0	1	1	3	0	1	0	0	0	8	4
Brother	Living	5	0	15	1	23	0	33	6	47	4	34	1	24	2	12	3	5	0	2	1	200	18
	Dead	3	0	1	0	17	6	17	4	33	9	28	6	14	4	11	4	5	1	1	1	130	35
Sister	Living	5	1	16	1	31	2	33	6	46	5	33	3	28	1	17	1	5	0	2	1	216	21
	Dead	1	0	6	3	10	5	16	4	17	2	25	7	13	5	9	2	6	1	2	2	105	31
																							4?
Children	Living	0	0	1	0	12	0	23	3?	32	1	21	1	19	1?	16	0	9	1	2	0	135	3
	Dead	0	0	0	0	3	0	4	1?	5	1	7	1	9	1	3	1	4	1	2	0	37	

* T = Tuberculosis.

TABLE 10

Family history—one parent tuberculous

		AGE GROUPS										TOTALS
		15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	
Married	Male	0	1	15	22	36	29	21	13	5	1	143
	With children	0	0	9	10	26	15	15	11	5	1	92
	Children tuberculous	0	0	0	1? 1 dead ?	1	1	1?	1 dead	1 1 dead	0	2? 3 2 dead 1 dead ?
	Female	1	2	6	13	8	10	5	2	1	0	48
	With children	0	1	3	13	4	5	3	2	1	0	32
	Children tuberculous	0	0	0	2?	1 dead	1 dead	0	0	0	0	2? 2 dead
Single...	Male	2	9	10	8	8	3	2	3	0	0	45
	Female	2	9	9	8	7	6	4	3	1	0	49
Widower	Male	0	0	1	0	2	0	2	3	1	0	9
	With children	0	0	0	0	1	0	1	3	1	0	6
	Children tuberculous	0	0	0	0	0	0	1 dead	0	0	0	1 dead
Widow..	Female	0	0	1	1	0	4	1	1	1	1	10
	With children	0	0	0	0	0	3	0	1	1	0	5
	Children tuberculous	0	0	0	0	0	0	0	0	0	0	0

TABLE 11

Family history—husband and wife both tuberculous

		AGE GROUPS										TOTALS
		15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	
Number of families		0	1	9	9	9	7	5	1	1	0	42
Children	Living	0	0	4	6	8	2	1	0	1	0	22
	Dead	0	0	0	1	1	0	1	0	0	0	3
	Tuberculous	0	0	0	3?	1 dead	0	1 dead	0	0	0	3? 2 dead

EDUCATIONAL INFLUENCES OF LOCAL CONDITIONS

From an educational standpoint the advantages of tuberculosis health resorts over the large industrial centers are obvious. In the latter is present the fear of infection already mentioned. The work-

man who is known to have tuberculosis soon finds his field of activity limited because of the fear his presence inspires in his fellow workmen. Even worse is the economic status of the person who has left his work, spent several months in some tuberculosis sanatorium and returned to his home an apparently arrested and quite innocuous case. He attempts to continue his former work, but is barred on the ground that he is a "consumptive" and hence a danger to his fellows. The outcast workman then is forced to resort to "camouflage" and the result is a change of attitude wholly detrimental to his moral status and material welfare.

In a health resort like Saranac Lake, on the other hand, we find no such conditions. The tuberculous patient is received into the ranks of industrial workers with never a stigma attached to him because of his previous condition.

The difference is one of education. The various boarding houses and hotels are influenced by the local Society for the Control of Tuberculosis. These houses, in general, are not conducted by old residents of native stock, but by people who have gone to the village, some for their own health, others merely for business reasons. The result is that all houses harboring tuberculous individuals are run on the best hygienic principles now known to workers in the subject of tuberculosis. Formalin fumigation is carried out thoroughly in all rooms vacated by tuberculous patients with open disease. Of greater value in general are the rules followed with regard to cleanliness and sputum hygiene which are well enforced in all the houses where the tuberculous live. Patients learn by imitation and the new-comers soon become quite reconciled to the use of the gauze handkerchief, sputum box, etc. Very quickly they adjust themselves to the new conditions and overcome all instinct to conceal the presence of the disease. With this last barrier of reserve broken down the measures taken to control and cure the disease are readily received and conscientiously followed.

It is obvious that conditions in a large city and in a small health resort are vastly different and yet it would appear that the gap is not too great to be bridged and that modified methods of education can be used to reach the city dwellers as well as those of the health resorts. Along educational lines lies the hope of future progress in the fight against tuberculosis.

SUMMARY AND CONCLUSIONS

The results of the survey here reported may be summarized and conclusions drawn as follows:

1. The incorporation of Saranac Lake, the more important part of the health district surveyed, owes its growth and present standing to its reputation as a health resort for tuberculous patients.

2. The present survey was made by a careful house to house canvass. All data and tabulation are based on personal interviews. It was not possible to check these data by clinical or laboratory methods.

3. About one-fifth of the total population of the district is made up of individuals who went to live there for their health. The number who went for any disease except tuberculosis is negligible. Pulmonary tuberculosis is the most common form of the disease manifested.

4. Six per cent of the tuberculous persons listed in the survey had not been under the care of a local physician since their residence in the district.

5. Indigenous morbidity and mortality from tuberculosis were low; but 0.3 of 1 per cent of living cases being found among the native born and 0.9 of 1 per cent among previously healthy residents. This result is in accord with investigations elsewhere and the conclusion seems justified that there is a minimum of danger of infection of healthy adult residents of resorts frequented by tuberculous patients. The more general application of this statement is worthy of careful consideration.

7. A total of 61 per cent of negative family histories was obtained. This would indicate that sources of infection are widespread and absence of direct family history by no means presupposes freedom from adult manifestation of clinical disease.

8. In families with both parents tuberculous there is more clinical tuberculosis in the children than if only one parent is tuberculous. Incident morbidity is very low among children in the health district.

9. Educational influences emanating from nearby sanatoria, and locally the "open door" for the tuberculous into unrestricted industrial and social activities have done much to remove fear and ignorance and to create an intelligent public mind toward the disease. With this sane attitude existent the problems connected with the control of tuberculosis are becoming less and less difficult of solution.

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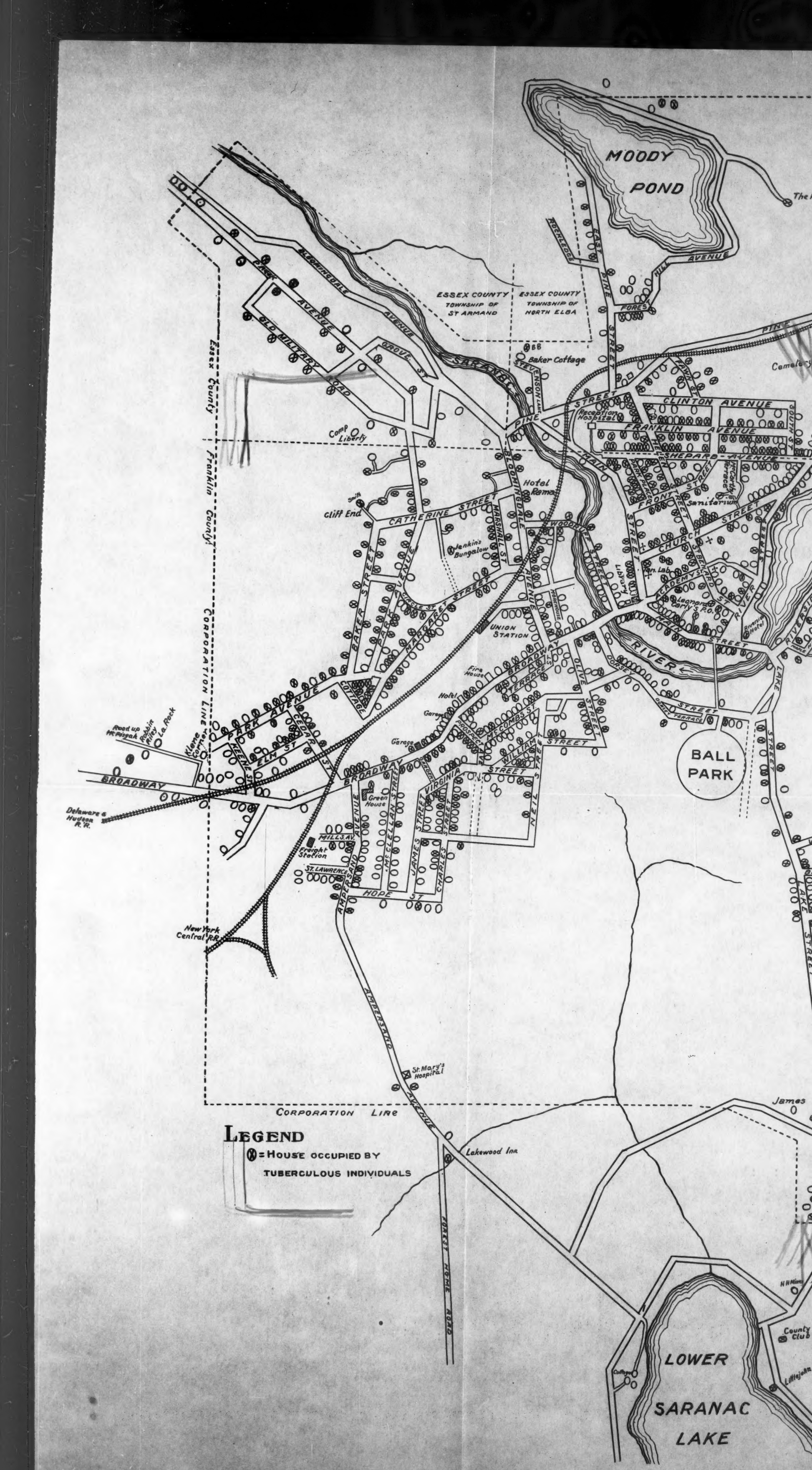
MOODY POND
ESSEX COUNTY TOWNSHIP OF ST ARMAND
ESSEX COUNTY TOWNSHIP OF NORTH ELBA
Essex County
Franklin County
CORPORATION LINE
PARK AVENUE
BLOOMINGDALE AVENUE
OLD MILITARY ROAD
GROVE ST.
SARANAC AVENUE
ROCKLEDGE
EAST PINE
HILL AVENUE
FOREST
PINE STREET
PINE
Baker Cottage
STEVENSON LANE
Cemetery
TAWA ST.
CLINTON AVENUE
Reception Hospital
FRANKLIN AVENUE
SOUTH ST.
SHEPARD AVENUE
MAIN STREET
PARK PLACE
FRONT STREET
McCarthy Terrace
Sanitarium
CHURCH ST.
St. BERNARD ST.
ACADEMY ST.
Sm. Lab.
Leonard Carly's P.O.
RIVER ST.
Riverside Hotel
Comp Liberty
BLOOMINGDALE AVENUE
Hotel Rama
Smith cliff End
CATHERINE STREET
Jenkin's Bungalow
HARSHALL ST.
WOODRUFF
LIBRARY
BAKER STREET
PARK AVENUE
CIRCLE ST.
MARGARET STREET
HORSHOUSE
UNION STATION
COTTAGE
Fire House
BROADWAY
TERRACE ST.
OLIVE STREET
DORSEY
OBSERVATORY TERRACE
LAKE STREET
Hotel
Garage
McCOMBS ST.
PROSPECT STREET
WILLIAM STREET
NEIL STREET
BALL PARK
Road up Mt. Pisgah
Robbin Riley
La Rock
Klone Corner
PARK AVENUE
CEDAR ST.
ELM ST.
KEENE ST.
BROADWAY
Delaware & Hudson R.R.
Green House
VIRGINIA STREET
JAMES STREET
CHARLES STREET
McCLELLAN STREET
MILLS AV.
Freight Station
ST. LAWRENCE
AMPERSAND AVENUE
HOPE ST.
New York Central R.R.
St. Mary's Hospital
AVENUE
AMPERSAND
CORPORATION LINE
James
Lakewood Inn
FOREST HOME ROAD
H H Miner
County Club
Lillejohn
LOWER SARANAC LAKE
LEGEND
⊗ = HOUSE OCCUPIED BY TUBERCULOUS INDIVIDUALS

INCORPORATION
OF

SARANAC LAKE

NEW YORK

HEALTH SURVEY
by
FORREST B. AMES
HEALTH INSPECTOR
1917

TUBERCULOSIS AMONG OUR IMMIGRANTS

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Efforts to exclude the tuberculous immigrant have received too little attention in the past and a thorough canvass of the situation would seem to be especially indicated at the present time, inasmuch as the possibility of a general unloading of tuberculous aliens from the countries of Europe is likely to follow the closing of the war. The unprecedented ravages of tuberculosis reported in France by Dr. Hermann M. Biggs (400,000 to 500,000 cases) brought about by war conditions, may be used as an index of what is occurring in some of the countries from which our immigrants of the future will pour. The extreme food shortage reported in the Central Empires, together with the severe strain on the vitality of the population resulting from the exigencies of war, would seem to offer ideal conditions for the widespread dissemination of tuberculosis, a disease that kills a relatively large percentage of mankind during normal times and which leaves its mark on most of those who die of other causes.

In a former article (1), read before the American Sanatorium Association in 1914, the writer called attention to the prevalence of tuberculosis among our foreign born population and emphasized the need of more stringent measures for eliminating tuberculous immigrants at our ports of entry.

The vital statistics of the United States show conclusively that our death rate from pulmonary tuberculosis is higher among the foreign born than among the native born population. In 1908 A. Stella (2) called attention to the prevalence of tuberculosis among Italians in the United States and found that 5.61 per thousand of all steerage passengers returning to Italy in 1906 were suffering from tuberculosis. In this study he also ventured the opinion that 50 per cent of all returning second class passengers were afflicted with this disease. C. D. Head (3) has called attention to the marked prevalence of tuberculosis among the Scandinavians in Minnesota, and has pointed out that the death rate

is much higher in that state among the foreign born than among the native born of this race. The increase in the tuberculosis death rate among those of Scandinavian parentage in Minnesota is shown by the following figures: 1890, 125.4 per 100,000; 1906, 133.0 per 100,000; 1907, 138.2 per 100,000 of population. In conclusion he urged "a rigid physical examination of the lungs of all immigrants from the countries of Norway, Sweden and Denmark."

It is the opinion of most medical men with extensive experience in tuberculosis that large numbers of immigrants with quiescent lesions, who would have continued in their usual health had they remained in their home environment, develop active tuberculosis after landing in this country. A letter received from a transatlantic steamship company stated this well known fact as follows: "It is our belief that tuberculosis is more apt to develop among the alien immigrant classes after a stay in this country due to changes in climate, working conditions, food, etc." It is important that the cause of the prevalence of tuberculosis among the alien immigrant classes should be considered, to determine if possible whether their infection occurred in this country or abroad. Immigrant aliens who develop pulmonary tuberculosis after landing may be divided into two classes: first, those who were free from tuberculosis on arrival and were infected after landing; and, second, those who had quiescent or active lesions on arrival that exacerbated or progressed following landing. The studies of some observers, notably Stella, would seem to confine most of these patients to the first class; but when the statistics upon which these conclusions were based are studied in the light of more recent knowledge concerning the infectiousness of the tubercle bacillus for adults, especially Baldwin's work, it appears justifiable to place the larger percentage of the adult tuberculous aliens in the second class. The after results of patients discharged from American tuberculosis sanatoria with arrested, apparently arrested, and early "closed" cases, with quiescent lesions, furnish an indication of what occurs in aliens who have definite, though inactive tuberculous implantations on landing. Stella quotes the dictum of Bertillion and Gebhardt: "The mortality and morbidity in connection with tuberculosis of a given social class is in inverse ratio to its average income," as bearing on this point in connection with the development of the disease among healthy Italians in this country. It can also be stated with certainty that the class of ex-patients mentioned above react to their environment, either favorably or unfavorably, depending upon the

standard of their living conditions (which should include habits and work as well as housing and income), in almost exact accordance to the "law or equation" of Bertillion and Gebhardt, as applied to the community in general. Other factors being equal, the ex-patients who live under the most unfavorable conditions suffer earlier and more violent exacerbations of their tuberculosis than ex-patients whose standards of living are higher. A maximum of overcrowding is almost sure to be associated with the greatest poverty and a consequent minimum amount per person of the poorest quality of food. According to modern thought, the work of Dr. Hermann M. Biggs (4), which established the direct relationship between overcrowding and the tuberculosis death rate in the tenement districts of New York City, proved that bad living conditions are fatal to those who are infected with tuberculosis. From our own experience we are convinced that the great majority of our Otisville ex-patients who live under such conditions do not exacerbate as a result of a superinfection from outside sources, but from an extension or "lighting up" of their old lesions. We have verified this opinion by physical examinations of their lungs following readmissions. Why should the inactive lesions of tuberculous immigrants prove an exception to this rule?

If our conclusions are correct, then it seems very unwise to admit immigrants with definite tuberculosis of the lung, even though this is arrested or quiescent; and to allow them to assume the great risk of suffering an early exacerbation after landing. Under such circumstances the country they seek to enter offers not an Eldorado, but sickness, poverty and an early grave.

The writer wishes it understood that his deepest sympathy is for those unfortunates who are victims of tuberculosis and he feels that no philanthropy can have a higher motive than alleviation of the sufferings of the indigent tuberculous, both at home and abroad; but it is apparent that funds for the treatment of tuberculous aliens can be expended to much better advantage in the countries from which they come. An appeal for funds was made in this country recently to finance an antituberculosis crusade in France and it has met with a hearty response. This movement will furnish the best indication of what may be expected from future antituberculosis activities in France and other foreign fields. The majority of immigrants are from the peasant class and have little knowledge of the infectiousness of tuberculosis or of the established prophylactic measures. Only a very small percentage understand

English and but few can either read or write their native language, a fact which nullifies to a great extent the educational efforts of the anti-tuberculosis societies of the communities in which they settle.

Opposition to inaugurating more intensive methods of diagnosis at our immigrant stations, with a consequent increase in the number of rejections of tuberculous immigrants, may be expected from the steamship companies, from the aliens already landed, from contractors who employ unskilled labor extensively, and from the various societies that are interested in the immigrants. Since the newly landed immigrants are likely to gravitate to localities inhabited by their kind, it is the alien population which will derive the greatest protection from a more rigid exclusion of the tuberculous; and their coöperation, rather than opposition, may be expected when they are made to understand the dangers with which they are threatened. Those who depend upon foreign labor for the conduct of their business, should welcome any effort to weed out immigrants who will later prove to be inefficients or dependents on account of tuberculous disease, while the charitable societies will assist in a plan that is in reality for the best good of the immigrant.

Personal experience has convinced the writer that the physicians and officials of the United States Public Health Service detailed for this work are worthy guardians of our country's threshold, but it is apparent to one who has visited the immigration station at the port of New York, on Ellis Island, that the medical machinery for handling the number of immigrants arriving at this port of entry during normal times, is ar from adequate. Moreover the tables given below should be sufficient to convince even the most pronounced sceptic that much more can be done towards rendering the system effective. It is possible for the present force to actually examine all of the immigrants arriving when the number is small, but the arrival of a large number makes it necessary for them to resort to the former inspection method. The routine examination of large consignments of immigrants at Ellis Island is as follows: The aliens are brought from the ships to the dock in tenders and are marched in single file past the doctors. Any gross mental or physical defects are noted as the immigrants pass by the inspecting physicians and these cases are then sent to the examination room for further study. The immigrants, as they pass in line, are fully dressed and it is not within reason to expect even an expert to sort out more than a small percentage of the tuberculous under such conditions. Those who are sent to the examination rooms are stripped to the waist and sub-

jected to a stethoscopic examination, as well as a thorough inspection. During the fiscal year ending June 30, 1914, the daily average of arrivals was 2750. It would seem quite necessary, and only fair to those who are subjected to the intensive method, that every immigrant should receive the same examination. The results obtained certainly warrant the general introduction of strict methods. Under normal conditions with the existing machinery, this is impossible owing not only to the very small force of medical men assigned to this duty, but also to the space alloted to them, which is insufficient for the intensive examination of large numbers of immigrants. Those selected for further examination disrobe to the waist and are examined in the same room. Separate rooms are assigned to each sex. During busy periods from four to five lines are examined at the same time and the doctors sit side by side at one end of the room, at the heads of the lines. It is evident that the confusion prevailing under such circumstances may have an influence on the physical findings of the doctors and tends to produce undue nerve tire. These conditions are unfair to the medical men and should be changed. It would seem highly desirable, if possible, to provide separate rooms or booths for each examining physician and also to provide an adequate number of men to carry on the work. Economy of the present kind is not only a misguided policy but is entirely unnecessary, as facts stated below prove that the revenue produced by the immigrant head tax of $4.00 is sufficient to cover the expense of providing and maintaining a large force of trained men, without causing a drain on our national resources. As a matter of fact, the immigrant is paying for what he is not getting—a proper examination.

The following statement by Commissioner General of Immigration Caminetti (5) disposes of the question of the availability of funds to cover the very necessary increase of the medical force:

> The principal ground upon which the Supreme Court supported the constitutionality of the provision of law authorizing collection of head tax from transportation companies on account of aliens brought by them to ports of the United States was that the so called tax was a contribution, the purpose of levying which was to mitigate the evils incident to immigration from abroad, and was not a tax in the sense of the Constitution and subject to the limitations imposed by that instrument on the general taxing power of Congress. There can be no question that the intent of Congress, not only originally but upon every occasion when the matter has been brought before it for consideration in connection with the increase of the amount of the head tax from time to time, was not to raise revenue for the general purposes of the Govern-

ment but to constitute a fund from which the expense of satisfactorily regulating and controlling our immigration problem might be paid, the purpose of the several increases in the amount being to afford a larger fund for the maintenance of the service. *Since the law provided for the collection of a head tax has been in force, up to the end of this fiscal year, there has been collected over $9,000,000 in excess of expenditures.* [Italics are writer's.]

The Commissioner General, in his report for the year ending June 30, 1915, also alluded to the favorable opportunities which were offered for a more intensive examination of the immigrants for physical and mental defects owing to the decrease in immigration and further stated that, "The results attained demonstrate the need of more minute physical and mental examination in connection with the medical inspection. In other words these results prove conclusively that more doctors are needed if the country is really to be protected from the introduction of disease and strain of mental deficiency." The following figures which were furnished by the medical officer in charge at Ellis Island, are also included in his report. From October 4, 1914, to March 31, 1915, "of 31,275 aliens examined by the ordinary method in vogue during normal conditions with respect to immigration, 5.37 per cent were certified for mental and physical defects." This "ordinary" examination was more thorough than during the periods of heavy immigration and he felt that this accounted for the increase from 2.35 per cent, the number certified for the fiscal year 1914. During this same period (October 4, 1914, to March 31, 1915) "11,974 aliens who came over in small shiploads received primarily an intensive physical examination" and 9.24 per cent were certified for physical or mental defects. The more intensive examination yielded an increase of nearly 4 per cent over those examined by the ordinary method and of nearly 7 per cent over those so certified in 1914.

Table showing results following more thorough inspection and examinations of immigrants at Ellis Island

PERIOD	METHOD OF EXAMINATION	NUMBER OF IMMIGRANTS EXAMINED	NUMBER OF IMMIGRANTS CERTIFIED FOR PHYSICAL OR MENTAL DEFECTS	PERCENTAGE OF CERTIFICATES FOR PHYSICAL OR MENTAL DEFECTS
1914	Ordinary	1,403,081	33,041	2.35
October 4, 1914, to March 31, 1915.	Ordinary (more thorough than in 1914)	31,275	1,677	5.36
October 4, 1914, to March 31, 1915.	Intensive	11,974	1,106	9.24

The Commissioner General makes the following pertinent conclusion:

Certainly there could be no better or more convincing argument than that afforded by the above figures for increasing the medical force sufficiently to insure that no alien shall be admitted to the country until he has been subected to a medical inspection really calculated to disclose his mental and physical deficiencies.

The effect of the more intensive method of examination on the issuing of tuberculosis certificates is apparent in the following table which shows the great increase of tuberculosis findings during this period, especially during the year 1916. A ruling of the Treasury Department makes it necessary to demonstrate tubercle bacilli in the sputum of an immigrant before a certificate of tuberculosis can be rendered. Such a certificate makes the deportation of the immigrant, so affected, mandatory under Section 2 of the Immigration Act. Physical signs alone, however pronounced, are not considered as sufficient evidence to warrant the rendering of a tuberculosis certificate. The difficulty of obtaining a satisfactory specimen of sputum when the donor, for obvious reasons, is disinclined to render the slightest coöperation, is apparent. During 1916, the Public Health Service formulated a new certificate—"Physical Signs of Pulmonary Tuberculosis, Affecting the Ability to Earn a Living;" and certified 69 immigrants under this heading. Cases so certified are not mandatorily deportable at the present time. Many of these cases probably have positive sputum, but the pressure which is brought to bear by outside influences when immigrants are detained for observation purposes is such that the period of observation is necessarily shortened in many instances. During 1914, the last year of heavy immigration, over one million immigrants were received at Ellis Island and only 22 certificates of tuberculosis were rendered. In 1916 only 176,462 were examined and 36 were certified as tuberculous, while 69 were certified under the heading, "Physical Signs of Tuberculosis Affecting the Ability to Earn a Living." This marked increase shows the great possibilities in store as 'intensive' examinations were made only on small shiploads. It is interesting to note that had 1916 methods and certificates been in force during the past nine years, the number of immigrants certified under the two headings would, in all probability, have been 3748 instead of 363, and in 1914 alone, 602 cases would have been so certified. It might be inferred from the above statistics that this country is receiving a physically and mentally inferior type of

aliens at present, as compared to normal times, but even if this is granted, the advantage of the more intensive methods over the ordinary routine inspection is pronounced enough to warrant its general application.

Table showing the number and percentage of tuberculosis certificates during a period of nine years at Ellis Island

YEAR	NUMBER EXAMINED	NUMBER CENRTIFIED "TUBERCULOSIS"	NUMBER CERTIFIED PER 100,000 IMMIGRANTS	NUMBER CERTIFIED "PHYSICAL SIGNS OF TUBERCULOSIS AFFECTING ABILITY TO EARN A LIVING"	NUMBER OF CERTIFICATES "TUBERCULOSIS" AND "PHYSICAL SIGNS OF PULMONARY TUBERCULOSIS, ETC."	NUMBER OF "TUBERCULOSIS" AND "SIGNS OF PULMONARY TUBERCULOSIS" CERTIFICATES PER 100,000 IMMIGRANTS
1908	689,474	32	4.6			
1909	733,267	44	6.0			
1910	912,026	32	3.5			
1911	749,642	34	4.5			
1912	726,040	20	2.7			
1913	1,044,457	38	3.6			
1914	1,009,854	22	2.1			
1915	242,722	26	10.7			
1916	176,462	36	20.4	69	105	59.66
Totals	6,283,944	284		69*	105	

Total numbers of cases of tuberculosis, including those certified "physical signs of tuberculosis, etc." for nine years, 353.

* Forty-six were deported, 20 admitted under bond; 1 still at Ellis Island. The writer has no data concerning the remaining two.

The present detention wards at Ellis Island are not sufficiently large to provide for the number of suspects which would follow the institution of strict examinations for all immigrants during heavy receivings. If more hospital space is not available, then a more rapid method of final diagnosis must be sought. It would seem as if X-ray examinations would be of great assistance in excluding non-tuberculous conditions and would be an efficient aid in confirming the diagnosis of pulmonary tuberculosis. The Public Health Service has already installed an X-ray apparatus with a stereoscopic outfit at Ellis Island which would serve as a nucleus for later expansion of this work, if a skilled roentgenologist could be employed. It is obviously necessary that this man should not be subject to a call to distant fields, as are the members of the force at present, but should be located at the station permanently. Additional X-ray equipment would be necessary, but the operating expenses would be negligible if compared with the resulting increased efficiency of the service. The present Immigration Act seems to cover the situation satisfactorily,

since it makes the deportation of cases of tuberculosis mandatory and makes no mention of specific signs or symptoms which must be present before a tuberculosis certificate can be rendered. The judgment of the medical men, based on a careful physical examination, a short observation period and an X-ray picture of the thorax should be sufficient to establish a diagnosis of tuberculosis in any given case. Those who dissent from this view should remember that we are placing the stigma of tuberculosis on many of our citizens every day in the year by the use of methods, which, in reality, are less thorough than those suggested above and it would seem as if we owe as much to our own people as to immigrant aliens of any class. (It is, of course, understood that in X-ray examinations of the lungs, very little attention is to be paid to shadows at the hilum, showing signs of former bronchial gland tuberculosis, but definite evidence of involvement of the lung parenchyma is of importance).

The cost of maintaining a large number of cases in observation wards for even a short period would seem to be considerable until it is c mpared with the cost of treating aliens who develop active disease after landing. The average length of stay in the various state, county and municipal tuberculosis institutions is about twenty-eight weeks, and the general average of maintenance per capita is approximately $10 per week. This shows that the average cost of treatment per individual in sanatoria is about $280, without taking into account the money invested in the plants and equipment. In addition to this cost, the question of relapse following treatment, the support of the family if the alien is married, and, in fatal cases, the burial expense must be considered.

In order to prevent mistakes in diagnosis and to protect the interests of the immigrants, the medical staff of the large ports of entry should include a sufficient number of experts on the physical signs of pulmonary tuberculosis, and all suspicious cases should be referred to them for final decision. These men should be located permanently at the station. If the general standard of physical examination can be raised and an adequate force of trained men assigned to each immigration station, then the various steamship companies will be forced to meet the changed conditions and more cases of tuberculosis will be eliminated abroad. These companies are fined $100 for bringing a tuberculous alien to a port of entry and must pay the expenses incident to any necessary observation period and also for the alien's deportation if he is rejected. The companies are not likely to carry cases of tuberculosis when it be-

comes an unprofitable business. The results obtained by the recent intensive method are so striking that it would seem feasible to continue and widen the campaign.

If the standards of physical examinations are raised at the large ports of entry, close coöperation with the Canadian authorities is of vast importance owing to the difficulty of maintaining an equally efficient service at the northern frontier stations. If the bars are put up at the larger ports and the Canadian gates are open, then immigrants bound for the United States, but who have doubts as to their physical condition, might come in via our northern border, a route which is but a little longer and only a trifle more expensive. Should this come, proper border examination must be arranged for.

The present slogan in medicine is prevention and some of the most earnest endeavors in tuberculosis work at the present time are directed towards the segregation of tubercle bacilli distributors. It has been said on good authority there are 1,000,000 cases of tuberculosis in the United States. The various antituberculosis societies and associations throughout the country are endeavoring in every way to increase the number of beds for the indigent consumptives. With these facts and efforts in mind, showing the great need for increasing facilities for fighting pulmonary tuberculosis among the present population, it would seem a just policy for this country to exclude all immigrants who have definite evidence of this disease.

Considering the subject from the broad aspect of national health, any plan that will prevent a larger percentage of tuberculous immigrants from entering the country should receive the approbation of the state, citizenry and especially of the medical profession. The United States Public Health Service men, in charge of the medical work at the various immigration stations, should receive the loyal support of the medical profession in their endeavors to exclude the physical and mental defectives without fear or favor.

IN SUMMARIZING, THE FOLLOWING CHANGES ARE URGED:

1. Reorganized and increased medical staffs with equipment at the various immigration stations for a satisfactory minimum physical examination of each immigrant.

2. The medical organizations to include a sufficient number of tuberculosis specialists and trained roentgenologists to carry forward proper examinations for tuberculosis.

3. An educational campaign to inform immigrant associations, steamship companies, and other institutions, of advantages to be derived from the excluding of tuberculous aliens.

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EDITORIAL

TUBERCULOSIS SURVEYS

Much interest is now excited in the actual discovery of unsuspected or concealed tuberculosis by systematic examinations of large numbers of people.

Thus far but few opportunities have been open. The tuberculosis dispensaries have in some instances been successful in following patients to their homes and inducing other members of the family to undergo examination. It is a difficult matter to accomplish. The most satisfactory survey thus far made by health authorities was that undertaken in Michigan in 1915–16. During the first year 11,528 persons in a population of 1,319,283 were examined and 2,914 positive cases discovered. ("Side Lights on the Tuberculosis Campaign," *Public Health*, November, 1916, p. 621.) Altogether, 44 per cent were found either clinically tuberculous or potentially such. Naturally these people voluntarily sought advice or were persuaded to undergo examination because of suspicious symptoms. The results are not surprising to the student of tuberculosis. They simply confirm well-established facts concerning the prevalence of infection. The Framingham, Mass., survey is still in progress with about one-third of the population examined for tuberculosis. The results of this concentrated effort are soon to be published. At least fifteen living cases have been found to each death thus far, a figure much greater than has been usually considered in estimates, but again not surprising because much recognizable tuberculosis goes untreated as such.

The selective draft examinations are disclosing numerous cases. Percentages varying from 2 to 6 have been reported, depending upon the skill or standards used. At no time has the vast extent of clinically recognizable tuberculosis been so impressively brought out. But for the paramount interest in war news the antituberculosis campaign would be head-lined; in fact it is now enhanced in no small measure.

The census of a tuberculosis resort such as has been made at Saranac Lake, the results of which appear in this number has an unique interest. It is the first attempt at a house-to-house canvass to elicit information

which the people could readily conceal. Moreover, the absence of manufacturing industries, and a sentiment not antagonistic to the employment of tuberculous persons, made a favorable situation for a successful study. Hence, while persons hitherto unreported or not under medical supervision were found, they were almost negligible in number.

In a community of 5000 persons, popularly supposed to be composed of the tuberculous, it was found that only one-fifth of the population settled there for reasons of health and that only 441 of these had actual tuberculosis. Beside the latter there were 860 recorded as transient residents during a survey lasting six months. During 1917 there were about 1200 tuberculous visitors reported to the Board of Health.

Under such conditions there was a good opportunity to discover cases of tuberculosis developed from local infection. What was the result? Certainly far from alarming. Sixteen living cases were of indigenous development but except in four cases not in the strictly native born.

Assuming that the survey was as complete as possible, what is the explanation of the comparative freedom of health resorts from indigenous disease, for similar results have been shown in Switzerland and Colorado? Is it better control of the source of infection? Is it the influence of altitude and sunshine as claimed for some resorts? The latter could not be maintained for the Adirondack resort, though the sanitary control is exceptionally good. Is it not quite as much the absence of crowding and industrial conditions, the larger opportunity for outdoor invigoration and generally higher standard of living? Introduce a few large mills with their accompaniment of hard labor, dust and crowded tenements and how long would a town of 5000 continue to have so low an incidence of tuberculosis?

E. R. B.

MEDICAL NOTES, ABSTRACTS AND REVIEWS

It will be the eventual purpose of the REVIEW thoroughly to canvass all literature on tuberculosis as it appears in other medical periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the Abstract Editor, Dr. George Mannheimer, 41 West 51st Street, New York, N. Y.

Non-Tuberculous Pulmonary Infections.—There is a class of cases presenting definite localized physical signs in the chest in which a close study of the clinical findings and the subsequent course do not seem to justify the diagnosis of tuberculosis which is so frequently made These cases have been reported by various observers, notably Lord, Riesman, Larabee, Hamman and Wollman, and Garvin, Lyall and Morita. Some of these observers found the chief infecting organism to be the pneumococcus, others the influenza bacillus, others the streptococcus in various strains.

The author's series consists of 22 cases which he divides into three types: the subacute, subacute with recurrences, and the chronic type. They fuse more or less into one clinical entity designated as subacute and chronic non-tuberculous pulmonary infections. Nine of the series are included in the first group. They were characterized by a subacute onset with coryza, marked cough expectoration, moderate fever lasting a few days, absence of pain, and occasionally hemoptysis. The cough and expectoration persist for weeks or months. In the second group the symptoms are the same, except that there are recurrences after an indefinite period of well-being; the physical signs appearing in the same area as in the former attack. Six cases are included in the group. Seven cases belonged to the chronic group; they have been under observation from two to seven years. The symptoms are similar to those in the preceding groups, but there is a slight tendency to impairment of the general health, and four of the patients had severe pain in the affected side of the chest.

The physical signs were in almost all cases confined to the lower lobe, the left more common than the right. In a few both lower lobes were involved and in one case the whole right lung. Early in the disease scattered sibilant râles may be present over any part of the chest; in one case there was pleural effusion. Tubercle bacilli were uniformly absent. The influenza bacillus predominated in the first group, the other cases of the group showing pneumococcus group I and streptococcus viridans. In the recurrent cases the pneumococcus predominated, the influenza bacillus being second. The same organisms were present in the chronic type. The ages were seven to sixty years with the majority in full adult life. Eight were males and 14 females. The seasonal incidence, both for original attacks and recurrences, was between October and April. The predominating features in all cases were cough and expectoration. Frank hemoptysis occurred in 2 cases, and bloody sputum at times in 4 others. Roentgen examination revealed changes which were rather insignificant compared to the extent of the physical signs. In 10 of the 18 cases examined the lower lobes showed an increase in density comparable to that found in chronic bronchitis and chronic passive congestion. Four of the chronic cases showed pleural adhesions.

The disease can be differentiated from tuberculosis by: 1. The absence of severe constitutional symptoms. 2. The localization of the lesion in the lower lobe. 3. The disappearance of the physical signs in a few months in the subacute cases. 4. The absence of spreading to other parts of the lungs. 5. The absence of tubercle bacilli and presence of large numbers of other organisms. 6. The negative or slight x-ray findings.—*Subacute and Chronic Non-Tuberculous Pulmonary Infect ons, J. A. Miller, Am. J. Med. Sc., December, 1917, cliv, No. 6, 805.*

The Primary Lesion.—The author takes exception to the term "tuberculous infection" as distinguished from "tuberculous disease." The former he prefers to designate as primary tuberculosis or "the primary lesion of tuberculosis." He describes it as an area of redness with discrete enlargements of the lymph glands draining that area. Consequently we may have enlargement of the post cervical glands if the infection took place through the tonsils; of

the bronchial glands if the infection entered through the lungs; and of the mesenteric glands if the portal of entry was the intestinal tract. A certain amount of immunity is set up as result of this primary infection. This immunity is not as strong in infancy as it is in adult life, and the bacilli which are hiding in various parts of the body are prone to spread and set up secondary foci whenever the resistance is lowered as a result of other diseases such as measles, pertussis, etc. The secondary tuberculosis in infancy shows little tendency to healing. Primary tuberculosis is a disease process which may light up any time. In the chest the glands cannot be palpated but may be diagnosed by the x-ray or by careful percussion. Dulness in the interscapular region is of great importance. It is often accompanied by low spinal dulness. There is, however, slight dulness present normally in the left interscapular space which should be distinguished from marked dulness of primary tuberculosis of the bronchial glands. The diagnosis becomes more certain when the dulness is backed up by D'Espine's sign. This is present when the whispered voice and expiration persists to be bronchial below the third dorsal vertebra. Since there is no direct danger from primary tuberculosis treatment must consist in confining the process to the primary stage by keeping up the resistance, in the prevention of reinfection from tuberculous surroundings, and in the prevention of new infection in the same region drained by the primary glands. The general symptoms of primary tuberculosis are treated by fresh air, well-regulated diet and rest. The air need not be cold and may be warm as long as it is fresh. The diet should be selected with the view of avoiding indigestion, especially fat indigestion from which these infants are very liable to suffer. Tuberculin treatment in infancy is dangerous as it is too easy to overcome the slight immunity present.—*The Primary Lesion of Tuberculosis; Its Significance, Diagnosis and Treatment, W. W. Howell, Boston M. & S. J., January 31, 1918, clxxvii, No. 5, 152.*

Intrathoracic Tuberculosis.—This work is based on the Roentgen examinations of over 600 patients, and suffering from all forms of tuberculosis, and on the clinical and laboratory observation of over 2500 cases at the Municipal Tuberculosis Sanitarium in Chicago.

1. Bronchial gland tuberculosis of children: The earliest is the bronchial gland tuberculosis of children, caused by the inhalation of droplets of tuberculous sputum or of dried tubercle bacilli. The primary lesion is usually small. A history of exposure is generally obtained. The child is noted to be physically and mentally below the average. Night sweats and fever may be present, with or without a slight cough. The physical examination shows an undersized, anemic, and undernourished child. Engorgement of the superficial veins of the chest is often found; occasionally there is a slight change of note in the interscapular region on percussion, and often there is a slight diminution in resonance over the right apex. Auscultation gives a positive D'Espine sign, very rarely râles, and occasionally friction sounds at the base. The pulse and temperature are unstable. The sputum and urine are negative. The x-ray shows enlargement of the bronchial glands.

2. Bronchial gland tuberculosis of adults: May be a recurrence or flaring up of a stationary process dating back to childhood. or it may be primary in the adult. A history of exposure may or may not be present. Progressive loss of weight, gastro-intestinal derangement, lack of energy, occasionally night sweats, slight dry cough, frequent colds, and unstable pulse and temperature are noted.

On examination there is found slight engorgement of the superficial capillaries on the chest, a diminished note over the right apex, and perhaps on percussion an area of slightly diminished resonance in the region of the 3rd to 6th dorsal vertebrae along either side of the spine. Auscultation gives a positive D'Espine sign, increased breathing and whispered voice over the right apex. Râles are usually absent. The sputum and urine are negative. The x-ray shows greatly enlarged hilus markings and various sized soft hazy shadows of the glands.

3. Phthisis pulmonalis: Is essentially pneumonic in type, and probably caused by the rupture of tuberculous bronchial glands into a bronchus. Rarely it may be caused by reinfection from without of an already infected person. It may occur in childhood in acute and chronic forms. The history of such a case will usually show a period of several months with constitutional symptoms, slight cough, sometimes night sweats, with or without haemoptysis. Later there comes a shorter period with intensification of the constitutional but still without marked pulmonary symptoms. Then the patient will begin to raise thick, yellow sputum, and present a diminution of constitutional symptoms. During the exclusive prevalence of general symptoms the physical examination may reveal only signs of bronchial gland tuberculosis. Later with the establishment of pulmonary symptoms the signs of consolidation and soften-

ing are found. Occasionally the only signs of early tuberculosis are to be found in the first and second spaces in the axillary region, the apices often being infected secondarily. The sputum shows albumin, elastic fibres and tubercle bacilli. Before the rupture of the tubercle, however the findings are the same as in bronchial gland tuberculosis. The complement fixation test may be positive or negative; the urine may show a positive diazo or urochromogen reaction. The x-ray shows a soft, poorly defined shadow above the hilus, generally unilateral; later a cavity may be seen.

4. Pleural tuberculosis: Either dry or with effusion, is a metastasis from a preëxisting focus in the bronchial glands or in the lungs. It is rarely caused by reinfection from without. Effusion in primary tuberculosis of children is rare. The history will reveal a period of weeks or months of bronchial gland tuberculosis symptoms. With the rupture of the tubercle and the infection of the pleura there is a great increase in the constitutional symptoms. Signs of fluid are found. The x-ray simply shows a dense even shadow, which is apt to be triangular in shape, with the apex upward. The remainder of the lung is indistinct.

5. Lymphangitis tuberculosa: Is characterized by an extension of the tuberculous process by continuity along the lymph channels from a bronchial gland focus. It is accompanied by a great amount of fibrosis. Its progress is slow and the prognosis good. The first extension from the bronchial glands proceeds toward the apices, is interstitial. and may break through into the alveoli. Bronchiectases may form. This type is not common, is clinically first apparent at the apices and spreads slowly downward. The onset is gradual, the constitutional symptoms mild, and the pulmonary symptoms scant. The pulse and temperature are unstable. The physical examination gives diminished resonance over the upper part of one or both lungs, moderate changes on percussion, slight or marked changes in breath sounds, with medium and fine moist râles. There may be displacement of the trachea and heart. The sputum and urine are negative. The x-ray shows greatly enlarged irregular peribronchial markings, marked bronchial gland involvement, with or without bronchiectatic cavities.

6. Miliary tuberculosis: Is a hematogenous metastasis, very often coming from a bronchial gland, which may result in a general miliary tuberculosis, or in abortive miliary tuberculosis with local manifestations in the kidneys, joints, etc. The x-ray is the best means of making the diagnosis. In the majority of instances tuberculosis is a cryptogenic disease, and the organic manifestations are due to bronchogenic or hematogenous metastasis. From the standpoint of therapy it is of immense importance, just as in other cryptogenic processes, to discover the crypts and use such treatment as will inhibit metastasis rather than try to treat the metastatic disease, after it has once manifested itself. Particular stress should be laid on the diagnosis of bronchial gland tuberculosis before the development of metastasis with its uncertain outcome.—*Phthisis Pulmonalis and Other Forms of Intrathoracic Tuberculosis, W. A. Gekler, Arch. Int. Med., July, 1917, xx, No. 1, 32.*

Inadequacy of the Classification of Pulmonary Tuberculosis.—At the present time there are two prominent classifications of pulmonary tuberculosis, namely, the Continental or German and that of the National Tuberculosis Association. However, neither these nor any of the others have been satisfactory, because they are based either upon pathology or upon etiology, and therefore, do not give an adequate idea of the patient's real condition. No adequate classification can be conceived until we realize that the clinical manifestations of the disease such as toxemia, loss of weight, etc., must be our basis for the stage of the disease, with the presence of tubercle bacilli in the sputum or the necrosis of a certain area of lung tissue as important but secondary features. The prognosis does not depend upon the extent of the lesions, but upon the natural resistance of the patient. All our treatment is based upon the stimulation of this resistance. Classification should be based upon symptoms and prognosis. When diagnosing tuberculosis we should consider first, is it active or passive, second, is there extreme toxemia and can this be conquered, third, has the patient sufficient natural resistance to offset the effect of his inoculation. It would seem, therefore, that tuberculosis could be clinically classified under these simple headings: (1) active; (2) passive; (3) advanced. Realizing the complex nature of pulmonary phthisis, no classification can encompass all cases. The above, however, is based upon the actual clinical condition of the patient, his ability to get well or not, and his expectancy of life, disregarding the amount of infiltration which may be present in his lungs.—*The Inadequacy of the Classification of Pulmonary Tuberculosis, W. C. Voorsanger, Arch. Diag., July, 1917, x, No. 3, 251.*

Standards of Diagnosis of Pulmonary Tuberculosis in Children.—Since pulmonary tuberculosis is exceedingly rare in

children of school age, it is surprising to note how frequently the diagnosis of the disease is made. Even if pulmonary tuberculosis does occur in children of school age, it is a very mild disease, only exceptionally causing death. Many cases brought to the author with the diagnosis of pulmonary tuberculosis were found either not to be tuberculous at all or suffering from glandular tuberculosis. The reason for this frequent diagnosis of tuberculosis in childhood is found in the standards for diagnosis of tuberculosis in children of the National Association for the Study and Prevention of Tuberculosis. Analysis of this report show that certain points are open to question.

The diagnosis and treatment of the disease cannot be standardized, individualization is the only feasable method. Even biochemical diagnostic methods have not been standardized, as is shown by the various ways in which the tuberculin test, the Wassermann, etc., are made. When exact biochemical reactions cannot be standardized, it cannot be expected that the diagnosis of such a polymorphous pathological process as tuberculosis should be. Nearly all symptoms enumerated by the committee as standards in the history of a case may be present, yet the child may not be tuberculous. One of the standards in the history, pleurisy, while it is almost always tuberculous in the adult, is not so in children. Then again, hemoptysis is a curiosity in children, and some of the other standards —fever, rapid pulse, and cough,—are constant symptoms of nasopharyngeal infection, which is far more frequent than tuberculosis. Night sweats are by no means pathognomic of tuberculosis, as they occur in other conditions and even in healthy children.

The official report mentions râles. However it does not say what sort of râles are significant, nor does it say that adventitious sounds, to be of significance, must be localized in one lung. Contrary to the report râles are always found over the apices. Changes in breath sounds are merely mentioned; yet these are the only signs which show intrathoracic tuberculosis in children—enlarged tracheobronchial glands.

The standards essential for the diagnosis of pulmonary tuberculosis—persistent and localized râles, and a positive tuberculin test, are open to criticism. Such râles are heard in children with unresolved pneumonia, bronchiectasis, etc., and, therefore, not solely in tuberculosis. Then again the tuberculin test is positive in tuberculosis of the glands and bones, and in a great majority of children between 4–14 years, who are infected with tuberculosis, but are not sick. To base a diagnosis on radiographic mottling is erroneous since a radiogram of a child over four years showing no mottling or opacities in the hilus region is very rare. To urge a diagnosis on this with a positive Von Pirquet even in the absence of constitutional symptoms, is a dangerous procedure.

Pulmonary tuberculosis is very frequent in infants in the form of an acute tuberculous broncho-pneumonia; it is very rare in a child over 3 years. When pulmonary tuberculosis occurs in a child of such age, the symptoms and signs are the same as in the adult.—*A Criticism of the Standards of Diagnosis of Pulmonary Tuberculosis in Children Issued by the National Association for the Study and Prevention of Tuberculosis, M. Fishberg, N. York M. J., November 24, 1917, cvi, No. 21, 967.*

Compromising With Consumptives.—There seems to be a great deal of confusion and disagreement in the diagnosis and treatment of tuberculosis. A one-sided point of view either in the diagnosis or treatment is not quite correct. There is a necessity for compromise. Not only the physical status of a patient should be considered in recommending a mode of treatment, but also his social circumstances.

The following are the minimum standards in the diagnosis of active tuberculosis: In the absence of constitutional symptoms and signs, and a negative history, there should be present definite signs in the lungs, including persistent râles. In the presence of constitutional symptoms and signs, there should be some abnormality in the lungs, but not necessarily râles. A process at the apices should be considered tuberculous, and a basal process non-tuberculous until otherwise proved. Hemorrhage is a sign of active tuberculosis until otherwise proved. Pleurisy with effusion is a presumptive evidence of tuberculosis. A dry pleurisy is not conclusive of tuberculosis without other signs and symptoms. Pain in the chest, night sweats, digestive disorders, etc., should be investigated. In a doubtful case keep patient under observation for a month or so with frequent sputum examinations.

In cases that are exceptions to these rules a compromise is necessary and justifiable.—*Compromising with Consumptives, J. B. Hawes, Med. Rec., September 15, 1917, xcii, No. 11, 447.*

Exactness in the Diagnosis and Treatment of Tuberculosis.—It is a recognized fact that when a positive diagnosis of pulmonary tuberculosis can be made by the examination of the chest, the case is no longer incipient. Treatment, to be effectual, must be instituted early. Nobody now waits for the discovery of tubercle bacilli

in the sputum before beginning treatment. X-ray diagnosis is surrounded by a number of difficulties. There are only a few who can properly make plates and correctly interpret same. Doctors should learn to interpret x-ray plates, to know whether the x-ray work that is done for them by so-called experts is good or bad.

Tuberculous infection is so common that it is safe to assume that any delicate child and most delicate young people, whose physical depravity cannot be otherwise explained, are infected with tuberculosis. Physical signs may or may not be found in such children, and a positive diagnosis, unless repeated examinations are made, is uncertain. The great number of children infected with tuberculosis never come under treatment in childhood. A large percentage of these develop pulmonary tuberculosis on reaching adult life. But then the opportunity to treat and cure them has been lost. The average adult is, generally speaking, immune against tuberculous infection. Tuberculosis is only developed after an incubation of years.

To meet the disease adequately, every child born should be periodically weighed and carefully examined; the Wassermann and Von Pirquet tests should be made, and the urine, feces, and sputum examined. Any defect discovered should, if possible, be rectified at once. We must not wait for the tuberculous patient to come for treatment; we must seek him out and teach him the best way of combating the infection. Every one should be warned to keep his weight within normal range, and children and adults showing any excess or deficiency in weight should be told how to regain the normal balance. The von Pirquet test under three years and the subcutaneous test after that age should be performed in every suspicious case. Tuberculin presents a nearly absolute diagnostic test for the presence of active tuberculosis, and is the best and only means of diagnosis in incipient cases. In such cases a cure can usually be guaranteed. If the test is positive tuberculin treatment should be commenced and properly carried out by a competent man. In addition nothing should be left undone to place the patient in the most favorable position from every standpoint. For the proper treatment with tuberculin, tuberculin dispensaries should be established, one to every 30,000 inhabitants, with good follow-up work. With such practice the conquest of the white plague ought surely to be in sight.—*A Plea for Greater Exactness in the Diagnosis and Treatment of Tuberculosis, R. C. Newton, Med. Rec., October 6, 1917, xcii, No. 14, 580.*

Early Diagnosis.—Although the sanatoriums have proved of excellent value, the results of sanatorium treatment have not come up to expectations. Whatever reduction in mortality from tuberculosis has been achieved must be ascribed to the method of prevention rather than to sanatorium treatment. It is a deplorable fact that the sanatoriums do not get the suitable cases. Most of the latter are at a stage where the disease process has made such inroads into the lung that most we can hope for is temporary improvement or prolongation of life for a few years. There are two reasons for this condition: the failure of the patient to consult a physician while the disease is still in the early stages, and the failure of the physician consulted to diagnose the disease in its early stages when a cure is possible. We must demand more attention to tuberculosis from our medical schools. State boards of licensure should demand of every candidate for license practical proof of ability to perform an intelligent chest examination. We must bring tuberculosis up to the dignity of a specialty and demand that the general practitioner refer suspicious cases to a specialist as he does with many other conditions. Only when the early diagnosis of pulmonary tuberculosis will become a fact will sanatorium treatment assume that rôle as a remedial agent which it justly deserves.—*A Plea for the Early Diagnosis of Pulmonary Tuberculosis, S. A. Silk, N. York M. J., September 8, 1917, cvi, No. 10, 449.*

Diagnostic Value of History and Symptoms.—If we had to depend on only a part of the means at hand in making a diagnosis, the relative value of these would be: first the history, second the symptoms, third physical signs, and fourth laboratory findings. The chest examination is practically worthless. From a good history and properly elicited symptoms a strong suspicion or even a diagnosis of tuberculosis can be made. The symptoms are of secondary importance only to the history. The latter should go into the most minute details. Begin with the grandparents and learn the cause of all deaths in the family, laying special stress on the intimacy of the patient with that member who died from tuberculosis. The so-called chronic bronchitis is the most fruitful source of infection. Learn all you can about the patient's past. Ascertain if he ever had glandular enlargementas a child, pleurisy, anal fistula, ischiorectal abscess, or discharging ears, as these are often forerunners of active tuberculosis. Habit and occupation should be carefully gone into. Coming to his present illness

find out how ong it is since he was perfectly well. Malaise, lack of energy, tiredness, and digestive disturbances are common early symptoms in tuberculosis. An increased pulse rate without any definite reason is suspicious. The temperature to be of any value should be taken every two hours for a week. A temperature decidedly subnormal in the morning is significant. Hoarseness is one of the most common early symptoms and is too often misinterpreted. Very characteristic are the morning hack and the so-called emetic cough. Frequent and protracted colds are often due to tuberculosis. If any symptom is pathognomonic of the disease it is hemoptysis. All other causes are so rare that it is wise to ascribe this symptom to tuberculosis, unless otherwise proved. Most of the pleurisies are tuberculous, and a history of a previous pleurisy is second only to that of hemorrhage in making a diagnosis.—*A Study of History and Symptoms as Being of More Value to the General Practitioner Than Physical and Laboratory Findings in the Diagnosis of Pulmonary Tuberculosis, S. A. Slater, Med. Rec., January 19, 1918, xciii, No. 3, 101.*

Diagnosis of Tuberculosis.—The author give some points in the routine physical examination of the chest as done at Fort Douglass.

Dulness on percusion is relative, since the normal note varies in different individuals as does also the prolongation of respiration. One should always percuss the lower or middle lobe first in order to ascertain the normal note for the particular individual. By percussing upward an abnormality is easier to detect. Auscultation is the most valuable means of arriving at a diagnosis. The peculiar high pitch of a prolonged expiration is more important than the prolongation itself. It is evidence of infiltration of lung tissue. We should also listen for other changes in breath sounds such as distant breathing and loss of the vesicular murmur. A higher pitched percussion note or slight dulness, together with distant or prolonged increased expiration, means infiltration of lung tissue. Whether this infiltration is active or due to old scar tissue depends entirely upon the presence of râles. In looking for râles the patient should be asked to exhale, cough and sharply inhale. This lessens the lumen of the tubes and brings out any adventitious sounds. In the early diagnosis the râle we are interested in is the fine crepitant or subcrepitant râle.—*Diagnosis of Tuberculosis, H. W. Hoagland, Northwest. Med., December, 1917, xvi, No. 12, 361*

Differential Diagnosis of Pulmonary Tuberculosis.—The differential diagnosis of pulmonary tuberculosis divides itself in two parts, that of early and late tuberculosis. Among the symptoms of early disease are: loss of weight, hemoptysis, fever, debility, and cough. There are well recognized clinical conditions other than phthisis in which these symptoms may appear. One of the first manifestations of hyperthyroidism is loss of weight, a loss greater than is usually seen in tuberculosis. Too frequently this with a slight increase in the pulse rate, with tremor, is misinterpreted. A most careful history and physical examination is necessary to arrive at the proper diagnosis. Hemoptysis is not always tuberculous. A frequent cause is mitral stenosis, which may often be overlooked. The bleeding from a gastric ulcer should not, if a careful history is taken, confuse the diagnosis. Patients with a slight evening temperature are not always tuberculous. It is important to consider in these cases foci of concealed pus in the sinuses, teeth, or urinary passages. Syphilis of an internal organ may be excluded by a Wassermann. Hodgkin's disease with fever may simulate tuberculosis, but the splenic enlargement, increased bronchial or mesenteric glands may suggest the underlying cause. Many patients with gastroptosis, low blood pressure and digestive disturbances manifest debility. In these cases there may be an exaggeration of the physiological difference over the apices, still more confusing the diagnosis. To assume that a chronic cough is tuberculous is absurd. There are other causes which require careful elimination. Acute broncho-pneumonia of influenzal origin offers an interesting field for differential diagnosis. Sinus infection is frequent in influenza, but rare in tuberculosis. Extensive involvement of the nasopharyngeal tract speaks in favor of influenza, and against tuberculosis.

The differential diagnosis of late tuberculosis is more difficult. Tumors, aneurysm, foreign bodies, and obscure lung conditions following abdominal operations may all suggest tuberculosis. Certain chronic influenzal bronchiectases are wrongly diagnosed phthisis. The differential diagnosis in elderly people between chronic bronchitis with emphysema and phthisis is important and often difficult. Repeated sputum examinations should be made before the diagnosis is determined. Many infectious or neoplastic processes which attack the respiratory tract, may, if long continued, simulate late tuberculosis. The history in these cases is as important as the physical signs.

The differential diagnosis of early phthisis does not offer much difficulty if care is used. It is carelessness and not ignorance which renders the differential diagnosis difficult. If there is any doubt the patient should be treated as if he were tuberculous. The possibility of thyroidism, mitral disease, concealed pus, and ptotic conditions should be thought of. A careful history and further examination will clear up the diagnosis. In late tuberculosis the problem is more complicated. Here it is impossible to differentiate between tuberculosis and other lung conditions without the necessary examinations, which could only be carried out in general hospitals.—*The Differential Diagnosis of Pulmonary Tuberculosis, W. H. Smith, Boston M. & S. J., January 3, 1918, clxxviii, No. 1, 1.*

The X-Rayed Guinea Pig in Early Diagnosis.—With the idea of working out a practical routine procedure for sensitizing guinea pigs in the rapid diagnosis of tuberculosis by means of the inoculation method, a small group of animals, weighing as nearly 260 grams each as it was possible to get, were inoculated with a fairly uniform dose of tubercle bacilli and, then, subjected to different doses of x-ray at varying intervals. The dose of x-ray was given with a Coolidge tube. The current was 60,000 volts, spark gap 6 inches, filter 0.5 mm. of aluminum, the target 12 inches, and the length of time five minutes. The animals were examined each day, and leucocytes and differential counts were made at regular intervals. Controls were also employed. The author recommends the following routine procedure: If the material intended for injection is sputum or if it is of a mucoid nature it is subjected to fifteen minutes' digestion with 4 per cent potassium hydroxide after Petroff's method and is centrifuged and washed before injection. If the material is fibrinous it is digested in 15 per cent antiformin, the length of time depending upon the resistance to digestion. If it is a clear fluid it is centrifuged and the sediment taken. From ½ to 1 cc. of the prepared material is injected into both groin and abdomen of the animal, which is then exposed every second day for five minutes to the x-ray, giving at least three exposures. If the animal is negative at the end of six weeks the test may safely be called negative. Frequently repeated doses have a greater sensitizing effect than one dose. The destruction of lymphoid cells alone is insufficient to explain the decreased resistance.—*On the Development of a Method for Early Diagnosis of Tuberculosis by the Use of the x-Rayed Guinea Pig, W. H. Eckford, J. Lab. and Clin. M., December, 1917, iii, No. 3, 175.*

The X-Ray in Pulmonary Diseases.—In acute lobar pneumonia except in the early and later stages of the disease, and in broncho-pneumonia of adults, the x-rays are of little value. When complications are expected in pneumonia, especially abscess, gangrene, and more particularly interlobar abscess, the x-ray is of great assistance, first by making the diagnosis, and, second, by saving the patient the discomfort and danger of the exploring needle. The focus of infiltration may be localized by the x-ray a few hours before the initial chill and before any physical signs are demonstrated. There is no definite rule as to the length of time the shadow may persist after the patient has defervesced. In most cases it disappears promptly. The difficulties of the recognition of pulmonary abscesses are often great. They may be detected by the irregular round or oval shadows, more definite than gangrene. Besides they show a tendency to the formation of cavities whereas in gangrene the process is that of a dying off of larger or smaller masses. The x-ray findings must always be studied in connection with the patient's condition, the kind of fever, and the character of the sputum. These are the decisive features and not the physical signs, which are often misleading. Adhesions, involvement of the diaphragm, and the differentiation of pneumonia from subdiaphragmatic lesions can only be determined by x-ray. In pleural effusion more definite and absolute information has been afforded than in any other pathological condition. Garland's S shaped curve of the upper level of the fluid has been amply verified. The fluid level is horizontal only under two conditions, namely, when the fluid is secreted very rapidly and when air is present. Adhesions play a very important part in the contour of the upper level and cause it to assume most varied shapes. No diagnostic information can be gained from the density of the shadow as to the character of the fluid, for serum and pus give the same kind of shadow. When the quantity of the effusion is 500 cc. or over, the shadow is usually typical, unless the exudate is of long standing or adhesions present. Pleural exudates associated with pneumonia are mos difficult to determine by the x-ray, as a combination of solid lung and fluid makes shadows difficult to interpret. The size of the shadow does not always agree with the area of dulness, since much depends upon the distance of the exudate from the chest wall. The best results in the interpretation of fluid in the chest are obtained when fluoroscopy is combined with the use of plates. Whenever possible, aspiration should not be made before an x-ray is taken, for the best

results in empyema are obtained if a tentative diagnosis is made from the history, physical signs, and x-ray findings, and the surgeon is prepared to operate immediately.

In pneumothorax the findings of the x-ray and the old methods of examination usually agree. However, small pneumothoraces are not infrequently found by the x-ray. when they are little suspected. These localized air shadows are usually found near the mediastinum.

Pleural tumors as a rule have massive effusions, which constitute the only x-ray findings. Of the tumors Hodgkin's gives the most clearly defined shadows. These are single or multiple, may occur in any part of the lungs, and are only discovered by the x-ray, as they give rise to no physical signs. Luetic tumors usually show massive, homogeneous shadows, most commonly found at the base. The shadows of carcinoma and sarcoma vary in contour, being sharply rounded or irregular.

One is tempted to neglect careful physical examinations in favor of the x-ray. The latter does not offer infallible diagnoses, and until it does the old physical methods should be encouraged, and the x-ray added as a part but not the absolutely decisive examination.—*The Roentgen Ray in the Diagnosis of Pneumonia, Pleural Diseases and Pulmonary Tumors, M. Manges, N. York M. J., November 17, 1917, cvi, No. 20, 917.*

The X-Rays in Phthisis.—While the x-ray should be used more frequently as a supplement to the physical examination of the chest, it should never be used as the sole means of diagnosis. An opinion based on it alone is of about the same value as an opinion based upon physical findings alone. Without a careful history, both lose much of their value; combined with other evidence, it may be of great value. The lung as seen on the plate or fluoroscopic screen presents the following shadows: the hilus and peribronchial shadow, the linear markings, and the dark background of the alveolar structure. The hilus shadow is composed of the larger bronchi, the great vessels, lymphatic and fibrous tissue, and the peribronchial glands. The tracheal glands lie behind the shadow of the great vessels and are not visible except when they are much enlarged and calcified. They may be seen in the lateral views. The glandular shadows are distributed along the course of the bronchi, and may vary from rather fuzzy, indistinct shadows to the dense white patches of calcification. The linear marking are composed of the arteries, the bronchi, with their surrounding connective tissue, and the lymphatics and lymphoid tissue of the lungs. Changes in the linear markings are due either to changes in the tissue around the bronchi, or, as is more often the case, to changes in the lymphoid tissue. The arteries of the lungs are not subject to change. The veins are situated midway between the branches of the bronchi, and are not included in the linear shadow. A pathological process in the lung structure tends to produce changes in the lymphatics draining the infected area. Therefore we would expect to find a shadow in the lung substance representing the site of the pathological process, and a fanshaped area of thickened linear markings representing the course of the lymph channels draining this area. The peribronchial glands may also show changes. All the lymph vessels of the lung tend to converge toward the hilus, excepting a small group near the periphery which drains into the pleura. Roentgen findings which are of value in making a diagnosis of tuberculosis may be divided into 3 distinct types—miliary, peribronchial, and parenchymal. The third is the most common type, and is seen as an insulated group of small white areas, usually near the periphery of the lung, from which spreads a fan-shaped area of thickened linear markings which extend toward the hilus. Thickened and mottled markings in the region of the bronchi may be seen; also large dense and, possibly, calcified peribronchial glands. As the process increases and these areas become larger the shadows overlap and the typical fan shape is lost. In miliary tuberculosis fine, discrete, dense spots are seen scattered evenly over the greater part of the lung field. There may also be evidences of a chronic lesion in one or both apices. These cases may show very little evidence on the physical examination, especially in children. The peribronchial type is very difficult to diagnose as far as the x-ray is concerned. The study of the chest with the fluoroscope has the advantage of being cheaper, both as to individual cost and as to equipment. It is also more easily and quickly done. The image seen upon the screen is that of the living, moving organs, and it gives data which could not be obtained from the plate, such as the movement of the diaphragm, lighting up of the lung fields during inspiration, the pulsation of the different parts of the heart and possible changes in the shape of dull areas in the lungs during change of position of the patient. Its disadvantages are the inability to study carefully the detailed structure of the lungs, and the fact that it does not give us a permanent record, that is, those interested in the case must rely on the personal judgment of the radiologist, whereas, with the plate, a joint

study is possible. The radiographic method has the advantage of giving an accurate, permanent record of the condition within the chest and should show any variation from the normal which gives rise to change in density, either diminished or increased. Sufficient data may be obtained from a single plate, or it may be necessary to take plates from the front and back, upright or prone, and in a considerable percentage of cases stereoscopic plates should be taken. The number and position of the plates to be taken can usually be decided upon at the fluoroscopic observation. Without the latter observation it is necessary to take at least 3 plates, two of which be a stereoscopic pair. The ideal procedure should be a fluoroscopic observation, at which time definite records are made as to the excursion of the diaphragm, changes in shape of any abnormal shadow in reference to respiration and position, also to the illumination of the lung fields during respiration and coughing. If, at the end of the examination, the diagnosis is in doubt or it appears to be negative, stereoscopic plates with patient in the sitting position and the tube behind, should be taken. Should the fluoroscopic findings be fairly definite, a single plate taken in the position which best shows the pathological process will be sufficient.—*The X-Rays in Phthisis, G. W. Holmes, Boston M. & S. J., January 17, 918, clxxviii, No. 3.*

The X-Ray in the Diagnosis of Pulmonary Tuberculosis.—In the diagnosis of tuberculosis by the x-ray the two essentials are a pair of well-taken stereoscopic views and a knowledge of the pathology and clinical course of the disease.

In the normal chest the heart, diaphragm, and ribs cast dens shadows. The hiluses cast shadows of medium density more or less parallel to the sternal border. Extending from the roots into the lungs, fanlike, are the pulmonary ramifications of the bronchi and blood vessels, easily recognizable. The lymph glands at the hilus are often enlarged and denser than the usual x-ray pictures of the healthy. This is also seen in x-ray plates of some people with clinical pulmonary tuberculosis. Commonly in the adult the increased hilus glands are due to foreign material brought by the lymphatics. Therefore, with only enlarged glands tuberculosis cannot be diagnosed with certainty in the adult. At times however, shadows are seen at the roots, which make one feel that there must be some tuberculous involvement. This, however, can only be determined by close correlation of the history and the symptoms.

Within the lungs there are changes of two distinct characters, distinct as to the distribution and shape. The first is characterized by linear arrangements along the course of the bronchi and the blood vessels, of small nodules or circular shadows. To be of use in diagnosis they should not be considered when in the immediate vicinity of the roots. In this type the clinical course is mild. Another type, associated with more advanced disease, is the mottling form. Here there is patchiness rather than linear beading. The tubercles are not arranged linearly and follow no definite outline. A third type, presents a fan shaped density at the periphery of the lung with its angle toward the root.

The majority of adults have been infected with tuberculosis in early life. The x-ray may show evidences of this infection in the form of dense, clear cut tubercles. Certain manifestations seen in plates, will tell whether the lesion is active or lat nt with a fair degree of certainty. From the plate alone we cannot say positively whether the lesion is active or quiescent. In an active focus there is an area of faint density surrounding the tubercles, causing their margins to be hazy. In the exudative type of active lesion there is a more or less dense shadow with irregular hazy outline, no individual tubercles being seen. In the healing lesion the margins are more definite, individual tubercles appear, and may undergo fibrosis or calcification.

The x-ray offers a most valuable aid in diagnosis, for it tells us not only the location and the extent of the lesion, but also its character much more accurately than can be told by signs and symptoms alone. It gives the most exact information as to the pathology. But it is not infallible. Its use should rather be for aid and corroboration in diagnosis and a better knowledge of the pathology.—*The Assistance of the X-Ray in the Diagnosis of Pulmonary Tuberculosis, F. H. Heise and H. L. Sampson, N. Y. State J. M., November, 1917, xvii, No. 11.*